THE DOCK & HARBOUR AUTHORITY

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Editorial

The Port of Calcutta.

The Port of Calcutta, which is situated at the head of the Bay of Bengal, a distance of some 90 miles from the mouth of the River Hooghly, is the most important port on the eastern coast of India. It serves as the shipping point for the provinces of Bengal, Bihar and Orissa, and partly for the Punjab, the United Provinces, the Central Provinces and Assam.

Calcutta is far from being ideally situated as a port, owing to the fact that the River Hooghly has to be continually surveyed, and a staff for this purpose, known as the River Survey Department, makes daily surveys in the more important localities. The Commissioners of the Port of Calcutta also maintain three powerful sand suction dredgers, which are continually dredging the river bars to maintain a maximum possible depth.

The Commissioners have always shown a progressive policy with regard to the development of the port, and it was decided in 1913 that the facilities then available were quite insufficient to cope with the steadily increasing trade, which had risen between 1882-3 and 1912-13 from 446,000 tons to 1,677,000 tons.

After careful consideration a large scheme of extension was decided upon, the first part of which consisted of four produce berths and one coal berth, which are known as the Riverside Berths, and the construction of these commenced just before the outbreak of war, but they were not completed until 1923, owing to interruptions caused by the war.

These four produce berths can accommodate vessels up to 615-ft. in length, and the transit sheds available on them consist of large double-storied buildings, the largest of which has an area of 127,000 sq. ft. on each floor. The coal berth can accommodate vessels up to 468-ft. in length and consists of a steel pile jetty. The total cost of this portion of the work was £1,875,000.

The main project of this scheme allowed for the provision of a new wet dock system, and although the plans had been drawn up before the war, work was not commenced until 1920. This project provided for a dock system of 13 import and 16 export berths, and by the middle of 1929 work had been completed on the entrance locks, two graving docks, a turning basin, and five berths and the additional berths will be constructed when the necessity arises, work on them being stopped for the present owing to trade depression.

Regarding the trade of the Port of Calcutta, this has in recent years been showing a steady decrease due to the world-wide depression, and the comparative figures available, which are for 1928-9 and 1931-32, show a drop of 202 vessels entering the port with a decrease on gross tonnage of over 900,000 tons. The import and export trade for the same years show a decrease of nearly 1,600,000 tons on imports and 1,300,000 tons on exports.

The chief commodity exported is coal, and this showed a decrease on the period mentioned above of 344,000 tons.

An illustrated article on the Port of Calcutta appears on another page and also forms the supplement for this month's issue.

Bromborough Dock.

Bromborough Dock, which is situated on the River Mersey, has made considerable progress since its opening two years ago, and at the present time it is showing a steady increase in the number of vessels calling and also in tonnage figures.

Since its completion it has been necessary to complete the equipment of the dock in order to facilitate the rapid discharge and loading of cargoes. During the past two years the most modern equipment has been installed and the necessary warehouses and storage sheds have been laid down. Three transit sheds have been built, two of them 360-ft. long by 75-ft. wide, and the other 300-ft. long by 60-ft. wide, and work has just been commenced on the construction of modern dockside silos which, when completed, will provide storage accommodation for 10,000 tons of kernels and similar bulk seed imports.

The main import at Bromborough Dock is whale oil and storage accommodation for this commodity comprises 22 tanks with a total capacity of 28,300 tons.

An illustrated article on Bromborough Dock's modern equipment appears in this month's issue.

New Graving Dock at Southampton Officially Opened.

The Southern Railway have in the past few years undertaken two schemes of development for the improvement of the Port of Southampton. The first scheme consisted of the construction of a quay wall about 1½ miles long; the dredging of a deep water channel, and providing berths for eight big ships in line. The second scheme provided for the laying down of a graving dock which was to be the largest in the world, and this dock was officially opened by His Majesty the King on Wednesday, July 26th, when the Royal yacht broke a ribbon at the entrance to the graving dock.

The graving dock, which is named King George V. Dock, is 1,200-ft. long, 135-ft. wide at the entrance, and has a depth of 59½-ft. from cope to floor, and has taken just over two years to construct. It is capable of dry-docking a vessel of 100,000 tons and provision has therefore been made for any vessel of this size which may be built in the future. The water capacity of the dock is 7,857,000 cub. ft., and this can be pumped out in four hours by means of four 54-in. centrifugal pumps.

To ensure the safety of vessels entering the dock, an approach channel has been made, which is 660-ft. wide with a turning ground of 1,500-ft. in width at the entrance and having a depth of water of 35-ft. L.W.O.S.T. The dock is closed by means of a steel sliding caisson which is 138-ft. 6-in. long on the centre line, 58-ft. 6-in. high, and 29-ft. wide.

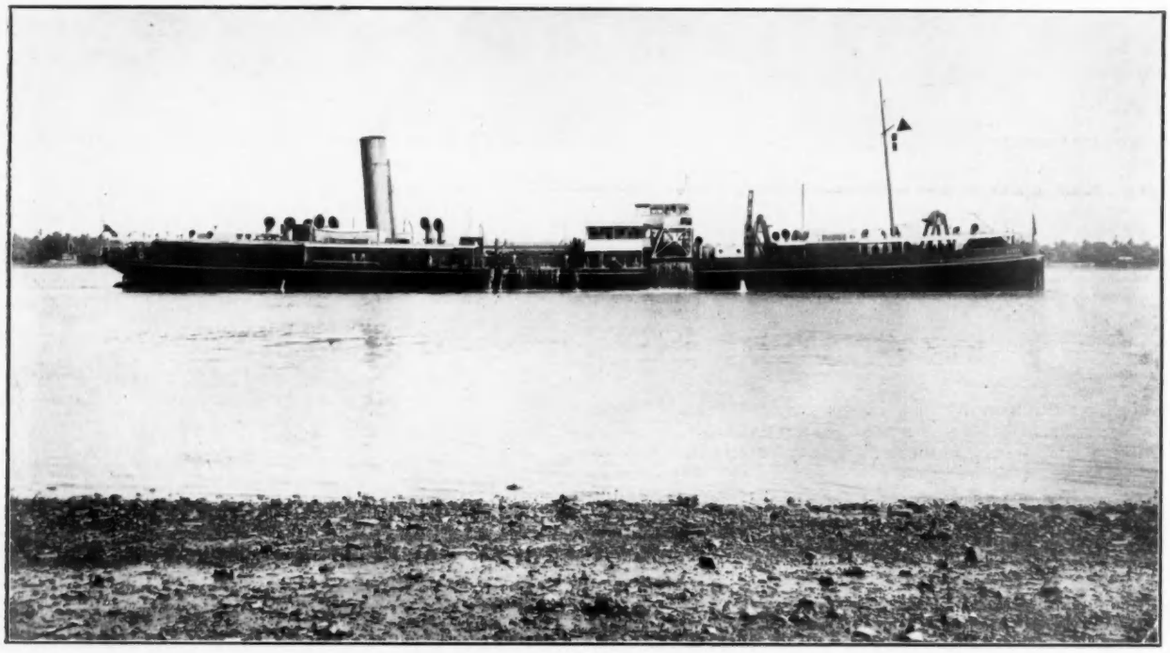
The Southern Railway are to be congratulated upon the enterprise they have shown in undertaking the construction of this new graving dock, and also the dock extension scheme, which is still being carried out. These two schemes will undoubtedly ensure Southampton in maintaining its position as the premier passenger port of the country, and should in the very near future attract more shipping and trade to the port.

An illustrated article giving details of these two schemes appears on another page in this Journal.

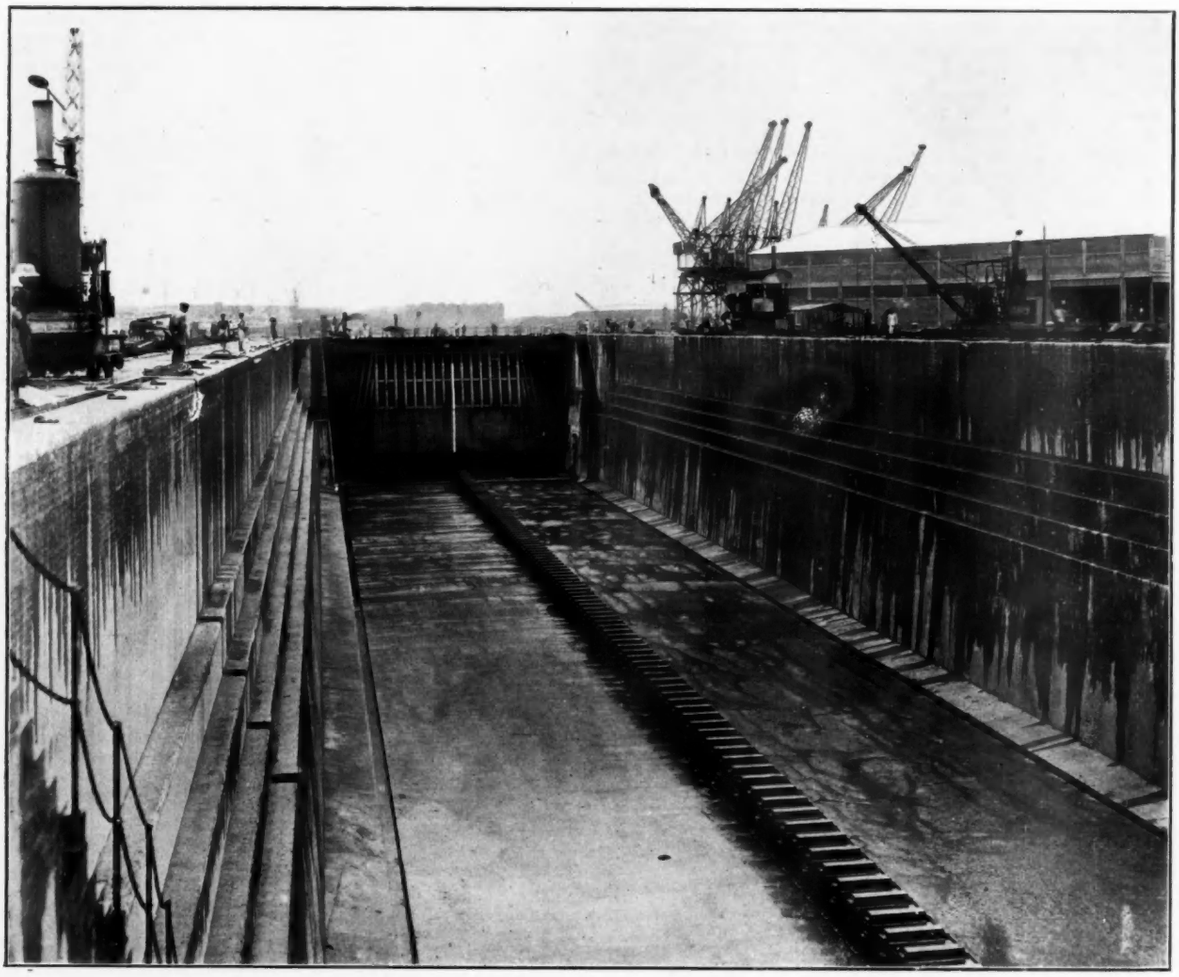
Meeting of Leith Dock Commission.

At a recently held meeting of Leith Dock Commission it was reported that the surplus revenue for the past year, after meeting all outgoings and providing for all liabilities, amounted to £10,030, while the previous year the surplus of receipts was £13,097. During the past year the sum of £79,963 was spent on new works, making a total expenditure for the period under review of £3,643,124. Owing to an increase in the export of coal, additional revenue was derived from that source, but, on the other hand, tonnage rates on vessels, rates on goods imported, dry dock rates and grain warehouse charges were lower. The year's revenue was further diminished as a result of reductions in the charges for the use of dry docks, and altogether it was estimated that £3,500 of revenue had been abated by the action of the Commissioners in reducing rates. Recently the Commissioners granted reductions in the rates on vessels calling for bunkers and vessels entering the port for repairs—these took effect from the middle of May last—and there are now announced substantial reductions in the charges for the use of the grain discharging plant at the Edinburgh Dock.

The Port of Calcutta



Suction Dredger "Gunga" at Work.



King George's Dock—Dry Dock No. 1, with Export Berth "A" in the background.

The Port of Calcutta

A GLANCE at the map will show that the Eastern seaboard of India is practically devoid of natural harbours. Madras was an open roadstead until the present breakwaters were built and the Port of Vizagapatam, which is now in the course of construction, has had to be dug out of the surrounding marshes. Calcutta, therefore, lying at the head of the Bay of Bengal and situated in a position that in countries more liberally endowed by nature with facilities for maritime trade would be considered laughably unsuitable for the purpose, has become by far the most important port on the Eastern coast of India. Through it passes the whole of the sea-borne traffic of the provinces of Bengal, Bihar and Orissa, and much of the produce of the Punjab, the United Provinces, the Central Provinces and Assam. The port is situated some 90 miles upstream from the mouth of the Hooghly, and the problem of keeping an adequate depth of water available throughout these miles of tortuous river is one of constant anxiety. In the days of the sailing ships, when time was not as valuable as it is to-day and modern facilities were not available, passengers were landed at Kedjeree, far down the estuary, whence they made their way overland, or by country craft to Calcutta, while the ships themselves slowly worked their way upwards, making use of favouring tides and anchoring during the ebb. The deep water channel now lies many miles to the eastward of Kedjeree, which has long been quite deserted, and inward-bound ships entering the river as soon as there is sufficient water to cross the first of the bars can reach Calcutta without difficulty on the same tide.

The River Hooghly is formed by the uniting of three rivers—the Bhagirathi, the Jelangi and the Mathabangha—all of which take off from the parent river Ganges. The first two of these spill rivers unite at Nadia, which is the starting point of the Hooghly, 160 miles distant from the sea, and the third enters it some thirty miles lower down. Considerable importance is attached to the prevention of deterioration in the upper reaches of the Hooghly, and the Commissioners for the port have obtained powers to prevent unauthorised encroachments or other obstructions to the free flow of the river.

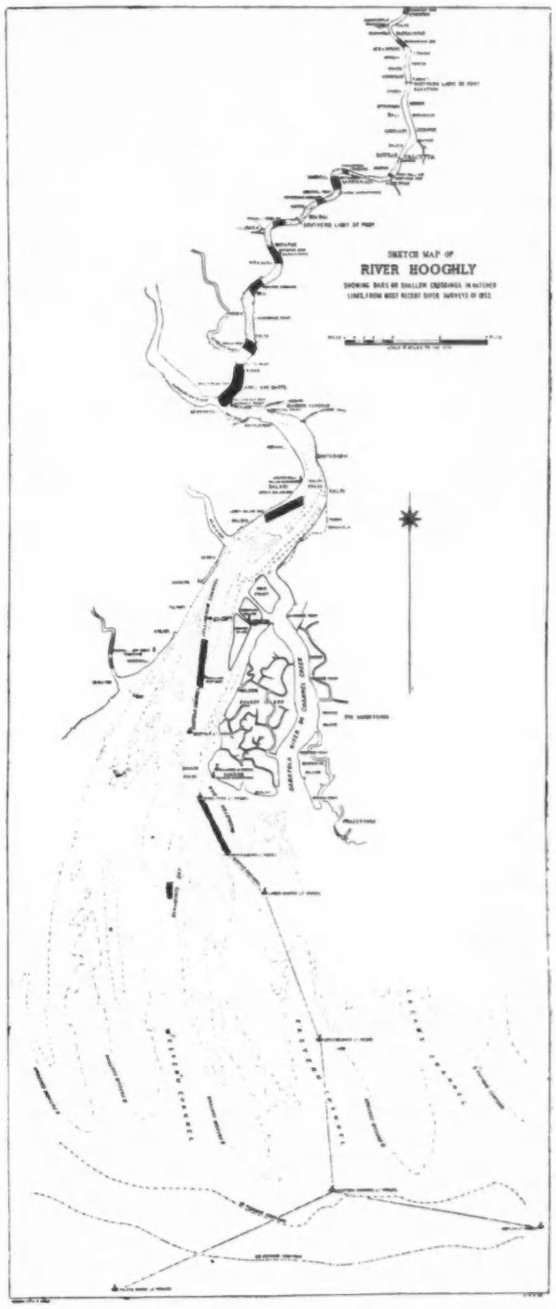
The river is tidal throughout the whole of its length, from the sea to Nadia, and the navigable channel, which varies considerably in width and is obstructed by a number of bars, is kept open to a very large extent by the action of the tides, which run with considerable velocity, particularly during springs, when, in places, a rate of over 7 knots has been recorded. During the months of July, August and September, when the melting snows of the Himalayas and the heavy rainfall of the Sou'West monsoon cause the river forming the head waters of the Hooghly to rise far above their normal level, the fresh water discharge increases from 70,000 cusecs to about 400,000 cusecs and the ebb current then runs continuously, though the level of the water rises during the flood period.

This freshet water is heavily charged with silt—the alluvium of the Himalayas in which the source of the Ganges lies. Calculations show that there is 1.1 cubic inches of solid matter to every cubic foot of water, and that 60,000,000 cubic yards of alluvium are carried past Calcutta annually. It is this alluvium of fine sand and mud which causes the troublesome shoals that occur at intervals throughout the length of the river and which gives the waters of the Hooghly their distinctive tint of cafe au lait.

The ordinary range of spring tides at Kidderpore Dock Sill is 11-ft. 8½-in. and of neaps 7-ft. At certain times of the year, during equinoctial perigee spring tides, a bore makes its appearance in the river. The height of the wave is usually between 4 and 5-ft. and it advances at a rate of 35 miles per hour. These bores entail some danger to shipping unless considerable precautions are exercised, but in recent years special bore moorings have been laid, and ships are also supplied with springs to ease the strain on their cables when meeting the bore, and by these means the number of even trifling accidents has been almost entirely eliminated.

The pilotage of an ocean-going vessel throughout the length of the Hoogly between the Sandheads and Calcutta depends on a number of factors, of which the available depth of water on the respective bars, the draft and speed of the vessel and the strength of the currents in the different sections of the river are the most important. Inward-bound vessels pick up their pilots at the Sandheads, some 40 miles off shore. Almost invariably they cross the first of the bars—the Middleton—as soon as there is sufficient water over it, and make the passage from the Sandheads to Garden Reach on the flood tide, arriving off the docks at or about high water.

At the Sandheads there are three lightships—the Mutlah, the Eastern Channel, and the Pilots Ridge—situated in a line roughly East and West and 20 miles apart. During the day each of these ships carries an easily recognisable mark at the mast-head and at night displays a distinctive white flashing light, which is visible in clear weather for 12 miles. Between March 15th and October 31st, during the period of southerly winds, blue lights are burnt every hour and every half-hour respectively from sunset to sunrise on the Eastern Channel and the Pilots Ridge light vessels. The reflection of the blue light on the clouds is visible long before the actual light itself and thus is of considerable value to a ship making her landfall when the sky is overcast. During the remainder of the year light off-shore breezes are the rule and navigation at the head of the Bay of Bengal presents little difficulty.



These three outer lightships were necessary in the days of sailing ships, but there is some doubt whether the two wing lightships—the Mutlah and the Pilot's Ridge—are really necessary under modern conditions, and it has been suggested that if two directional wireless beacons were installed they could safely be abolished. If directional wireless beacons were installed, one would be situated on Saugor Island and the other near the coast to the westward, and these would enable inward-bound ships fitted with the necessary receiving gear to fix their position accurately long before any lights were visible.

Leading shorewards from the Eastern Channel light the fairway is defined by the Intermediate and Lower Gaspar attended light vessels and by ordinary channel buoys. The Upper Gaspar, an unattended light vessel, marks the narrowing of the channel

The Port of Calcutta—continued

The bulk oil installation at Budge Budge.

View from the air of the downstream end of the Calcutta Jetties with the town of Calcutta in the background.

near the seaward extremity of the Middleton Bar. This bar, though relatively stable, has for some time past been the governing factor for by far the greater portion of each year, affording a depth of about 31-ft. at high water ordinary springs. The great width of this bar, the nature of the bottom and its exposed position make it exceedingly difficult to dredge it effectively. The limits of the channel across the bar are defined by gas buoys and at its inner end by the Middleton unattended light vessel.

Above the Middleton Light Vessel the channel broadens into an anchorage known as Saugor Roads, with Saugor Island, on the seaward end of which there is a lighthouse, lying immediately to the eastward. From Saugor Roads to the Haldia River, a distance of 23 miles, the channel pursues its course between the sand banks of the estuary and is subject to cyclic changes both in direction and depth. It is defined by gas buoys and there is one unattended light vessel—the Gabtolla—at its southern end. During recent years this section of the river has been in good condition and the Jellingham, which is the only bar throughout the whole of its length, seldom causes any obstruction to navigation.

Some miles above the Haldia River is the Upper Balari Bar with a depth over it of about 30-ft. at high water. A short distance above the Upper Balari Bar, Kalpi Roads mark the end of the estuary and thereafter the characteristics of the channel are those of a tidal river stable in position and subject to seasonal and not cyclic changes. The channel is lit for navigation by night as far up as Hospital Point, at the upper end of Diamond Harbour, which is situated about forty miles below Calcutta and eighty miles from the Eastern Channel light vessel, and on this section of the river a very complete system of gas buoys and lighted shore transits has been devised.

Five miles above Hospital Point lies the Eastern Gut Bar, popularly known as the " James and Mary." This is the most difficult point in the whole length of the river. The channel abruptly alters its direction through an arc of about eighty degrees and the Rupnarain River flows into the Hooghly at the apex of the curve, causing severe eddies, particularly when the ebb is running strongly. The depths on the Eastern Gut Bar vary considerably, almost from day to day, but the available water has been considerably improved during recent years. Before systematic dredging was introduced the depth over the bar had on occasions shoaled to as little as 6-ft. reduced, but in recent years the depth has considerably improved and an average of about 17-ft. reduced is now maintained. Above the James and Mary Reach there are two further bars at Royapur and Moyapur, which are of considerable importance to outward-bound vessels and which receive a great deal of attention from the Commissioners' dredgers.

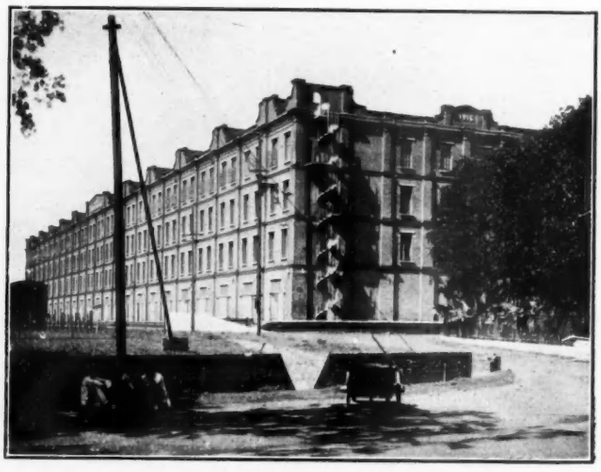
Three miles above Moyapur there is a safe anchorage in Ulubaria Reach and from here upwards the river has recently been lit for night navigation. There are five further bars between Ulubaria and Calcutta, viz., Poojali, Pir Serang, Munikhali, Sankral and Panchpara, known as the Low Water Crossings, because until recently outward-bound vessels almost invariably crossed them at or near low water.

Vessels drawing as much as 30-ft. 6-in. have left the port during spring tides, but the average maximum draft varies between 29-ft. at the height of springs and about 24-ft. during neaps.

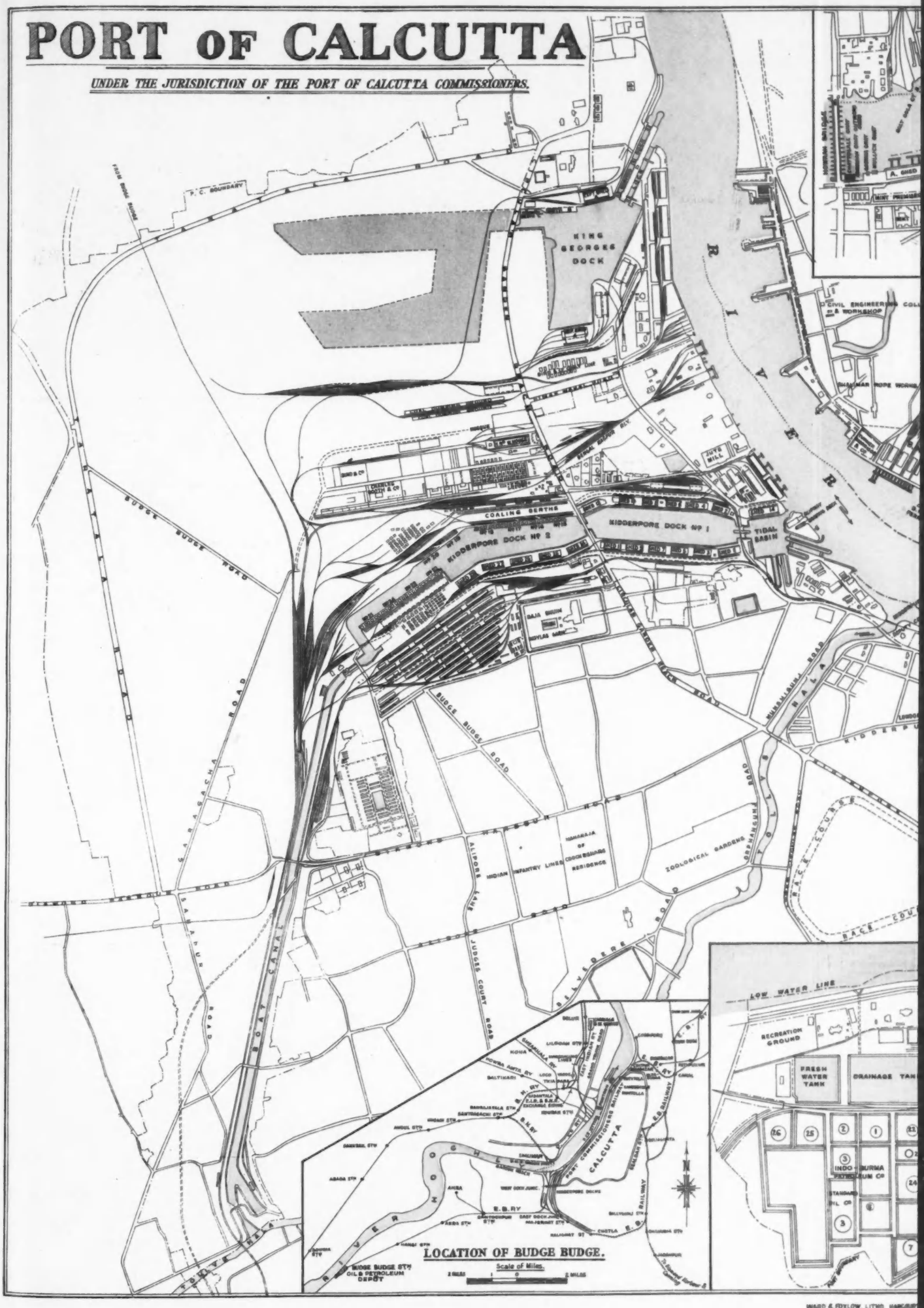
Vessels leaving the port have to meet the tide and are, therefore, confronted with totally different conditions to inward-bound ships, which have the tide under them. The methods employed in getting outward-bound ships away vary according to the maximum drafts available and these differ from day to day according to the range of the tide. Drafts are also affected to some extent by the seasonal fluctuations of the river.

The procedure which was followed for many years before the lighting of the upper reaches, and which is still followed at certain seasons of the year, is for an outward-bound vessel to be moved from her berth in the docks, or her moorings in the stream, to Garden Reach, at the lower end of the port, in charge of an Assistant Harbour Master.

Monoliths of the Lock Entrance Walls being sunk.



The Hide Road Tea Warehouse. One of the two tea warehouses belonging to the Commissioners.



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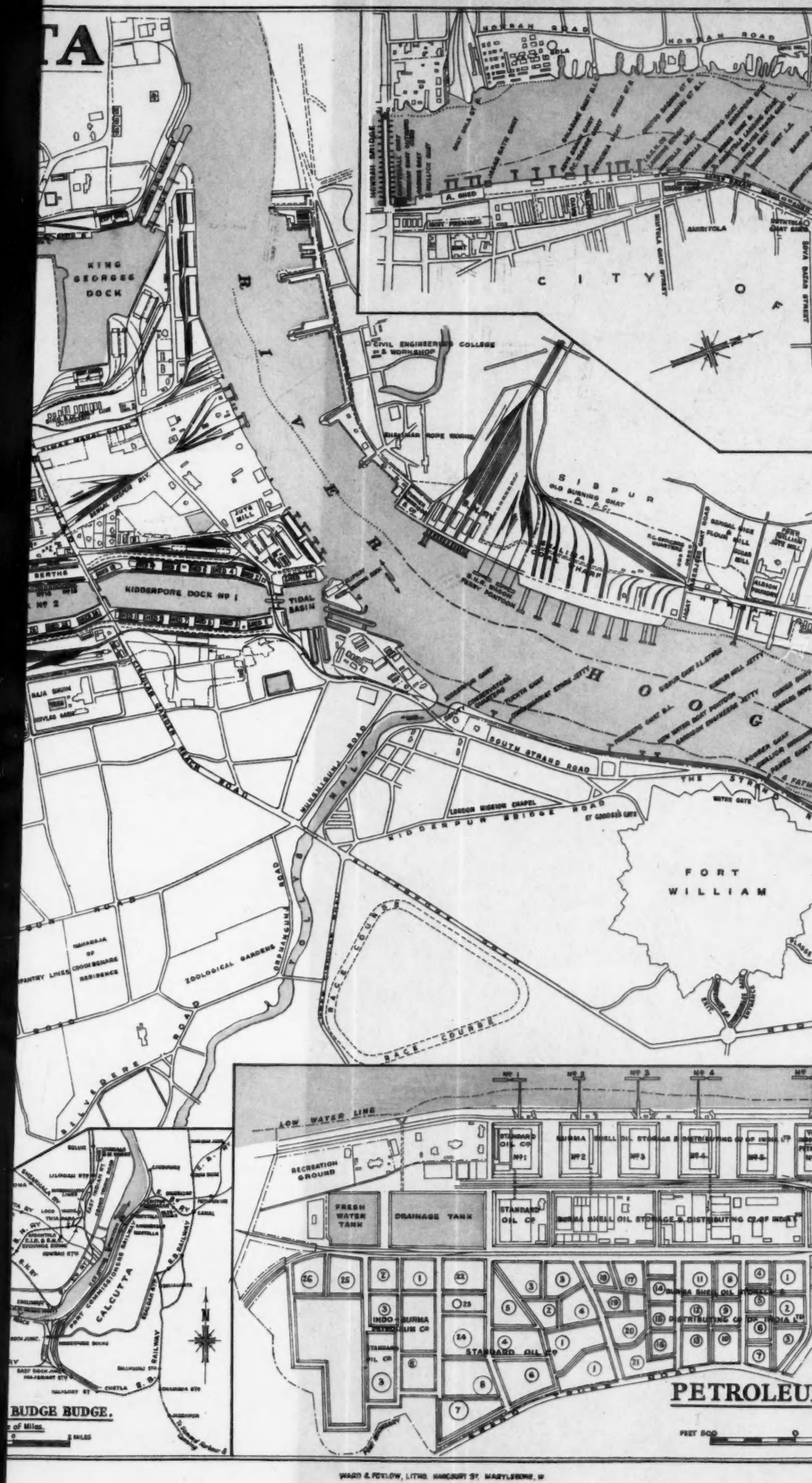

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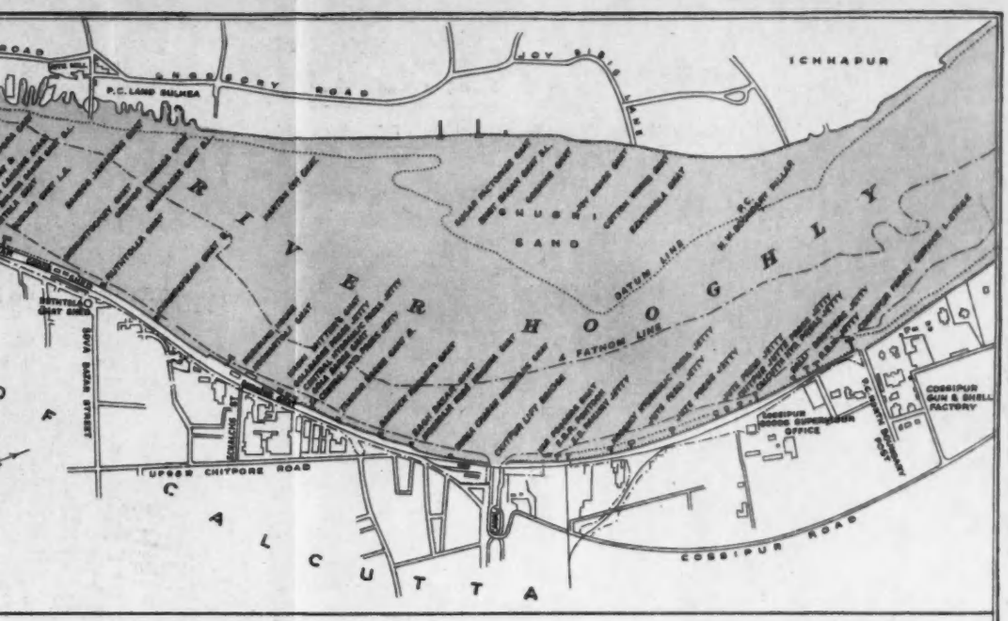

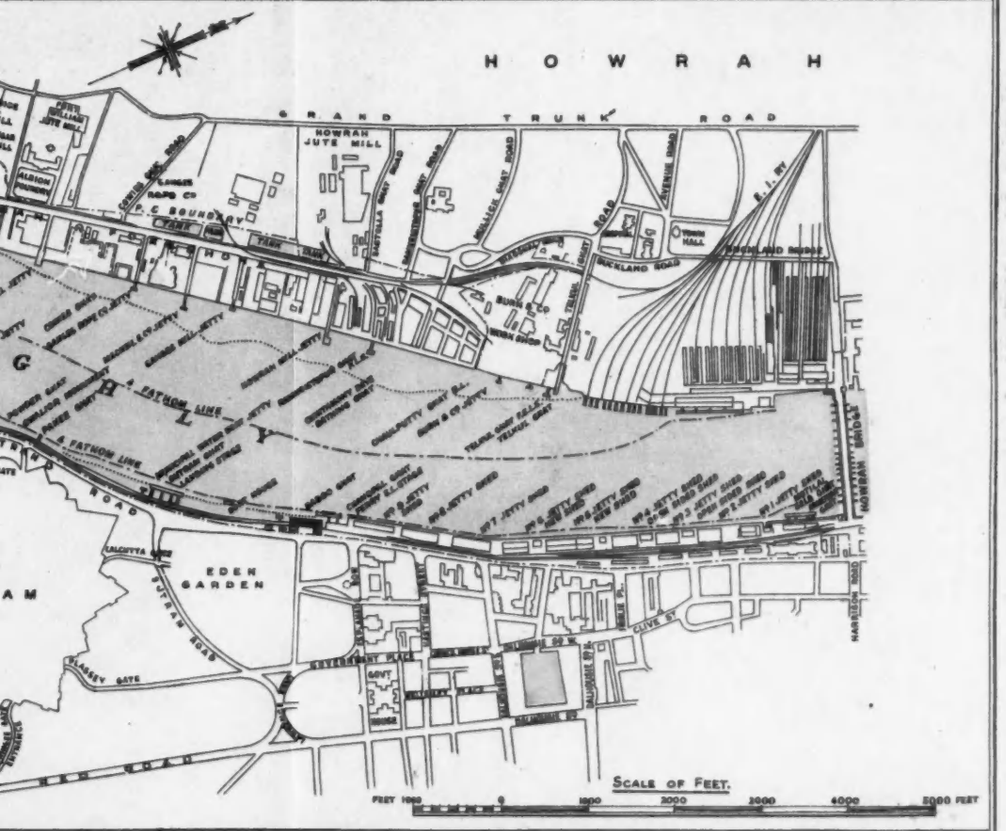

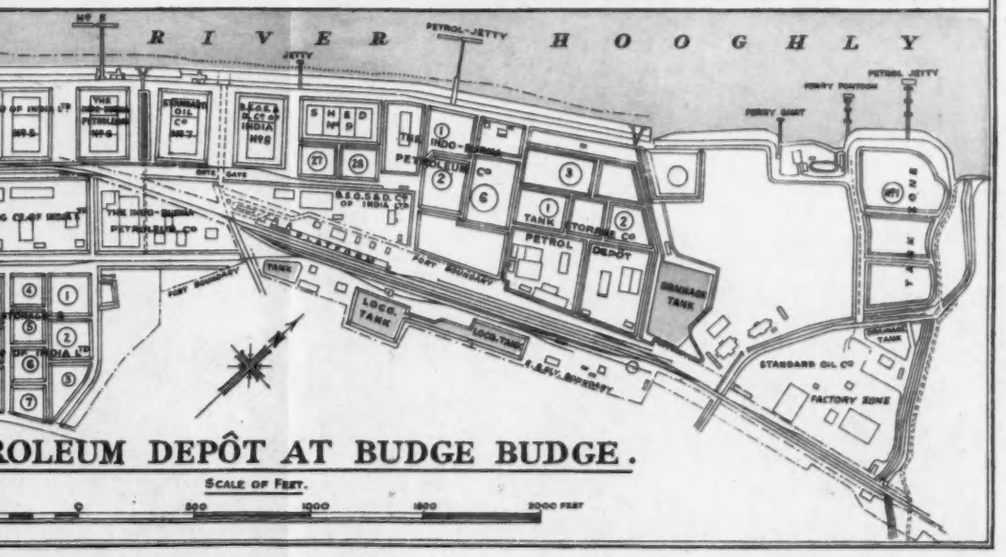

ROLEUM DEPÔT AT BUDGE BUDGE.

SCALE OF FEET.

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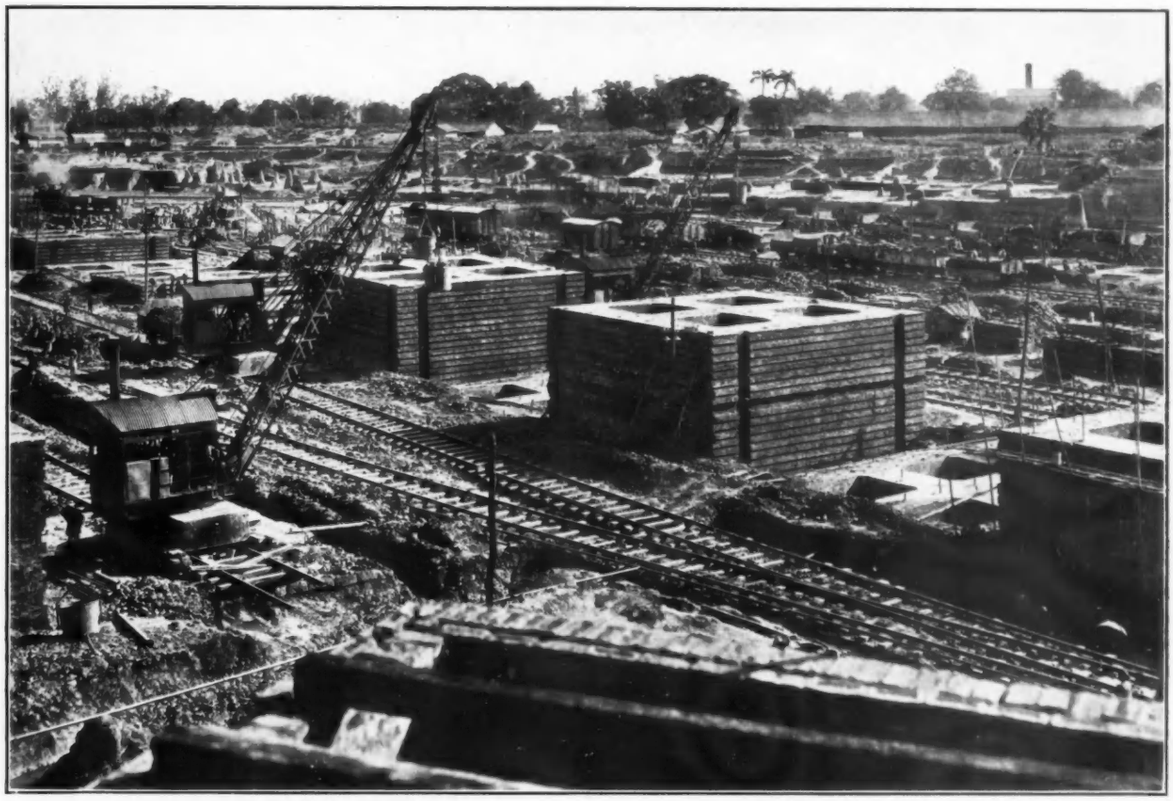
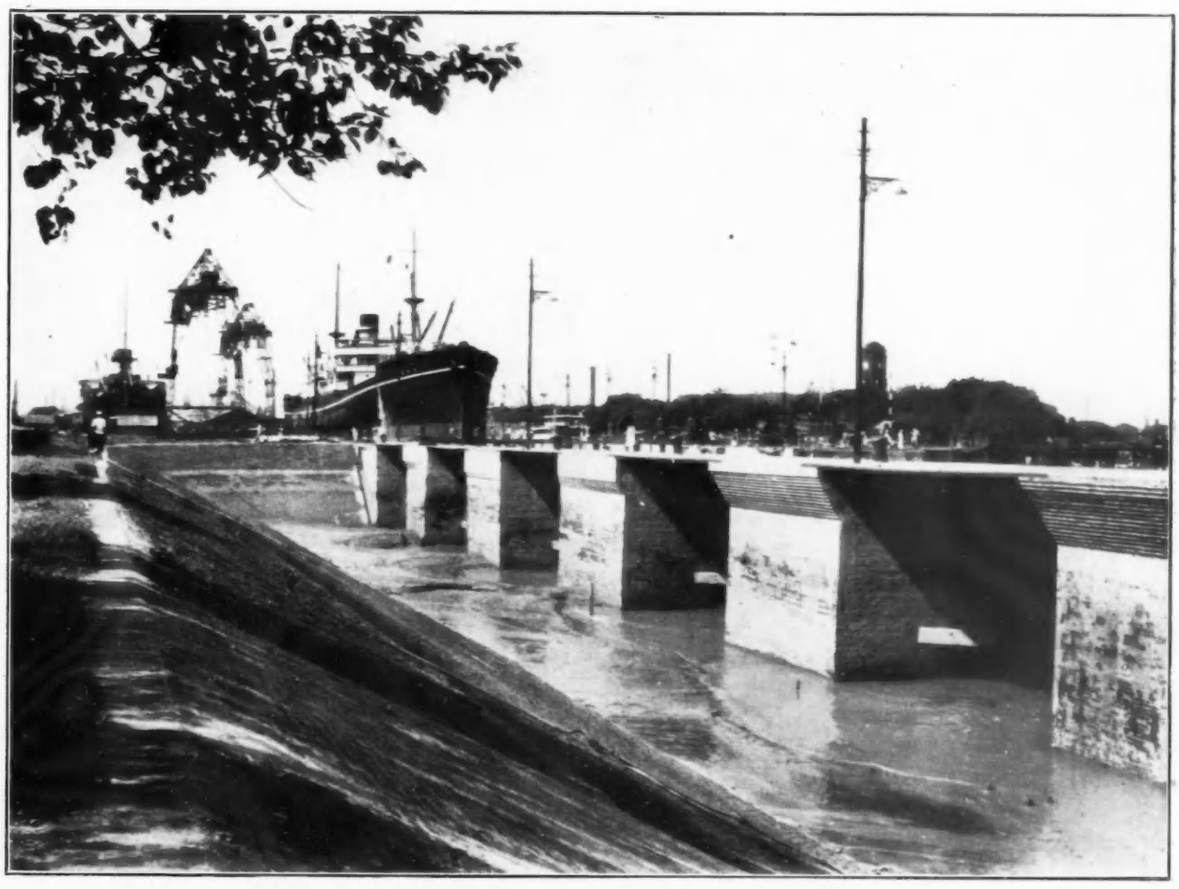
The Port of Calcutta



Monoliths of the Quay Walls being Sunk.



A View from the back of the Approach Jetty to the New 80-ft. Lock.

The Port of Calcutta—continued

A steamer loading manganese ore in Kidderpore Dock No. 1. The 100-ton sheer legs are in the background.

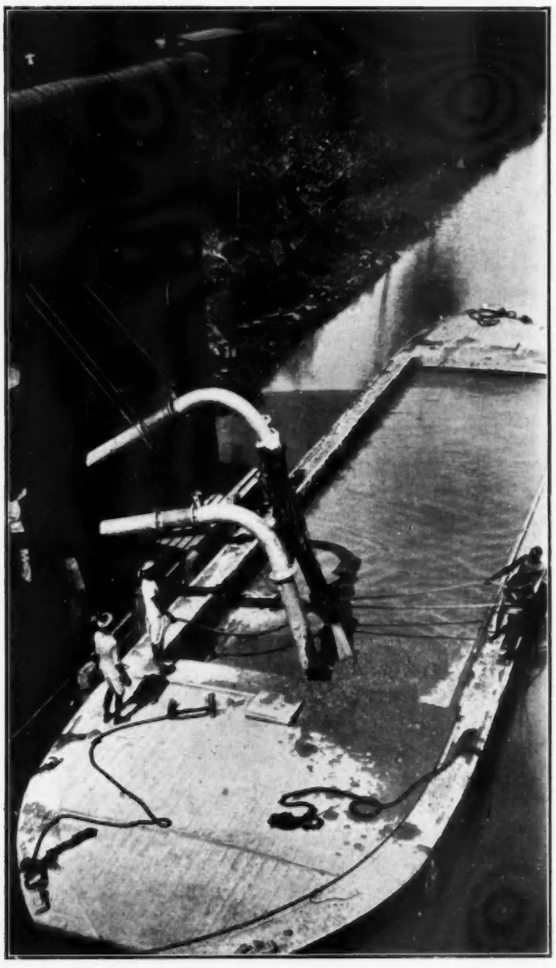
She anchors in Garden Reach and the Assistant Harbour Master makes over to a member of the Bengal Pilot Service who takes her to sea. She leaves Garden Reach about two hours before low water at Kidderpore Docks and crosses the Low Water Crossings at or about slack water, meeting the first of the flood near Poojali and crossing the bar at Moyapur and Royapur as soon as the tide has risen sufficiently. The vessel will then arrive at the Eastern Gut Bar somewhere near high water and will be able to proceed down the river on the ebb. The distance she will be able to go will depend on her speed, and of course on her draft. If she is not very deeply laden she will get across the Balari Bar, and possibly the Jellingham also, before the tide has fallen too far. She will then anchor in Saugor Roads for some hours until the tide has risen sufficiently to permit her to cross the Middleton Bar—the last of the obstacles which she has to encounter on the way to the open sea. If she is too deeply laden or too slow to reach the Upper Balari or the Jellingham Bar while there is still sufficient water over them, she will have to anchor again in Kalpi Roads and will of course be delayed in getting to sea.

Between March and September, however, the available depth of water over the Low Water Crossings is considerably reduced, so that deep draft ships cannot navigate them at low water. The

View from the air of the Maidan and Fort William. The Commissioners three suction dredgers, one of the Bengal Pilot Service's station ships and two cargo steamers are lying at river moorings in the foreground.

only alternative is to cross them after the tide has risen considerably, but this means that it is not possible for outward-bound ships to reach the Eastern Gut Bar before the tide has fallen too low to permit of it being crossed. Until recently such ships had to go into moorings at Budge Budge (the bulk oil depot, some 14 miles below Garden Reach) and wait until the next day before proceeding down the river. This, for several reasons, was an unsatisfactory arrangement. It entailed great delay, mooring and unmooring at Budge Budge was an added expense and only a limited number of moorings are available there.

Some two or three years ago, therefore, the Commissioners for the port, in co-operation with the Bengal Pilot Service, decided that Ulubaria Reach, some four miles below Budge Budge, would form a safe anchorage, and that if the river between Ulubaria and Garden Reach were lit, navigation by night would be practicable. This was carried out and deeply laden ships can now leave Garden Reach at night late on the flood tide and proceed to Ulubaria, where they anchor and wait for the next tide. They are then in a position to cross Moyapur



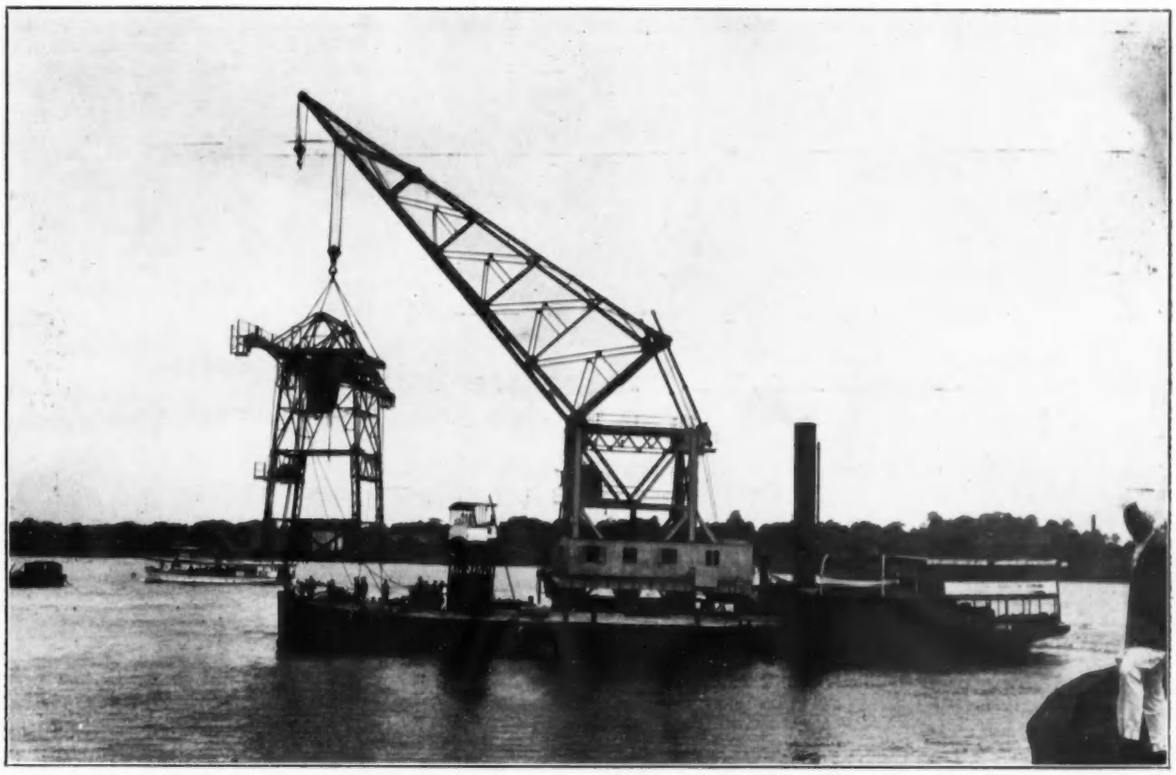
Silt Dredger being emptied.

at the earliest possible moment and to continue down the river as before, not only having maintained their draft, but having experienced a minimum of delay.

A river such as the Hooghly necessarily requires a very efficient system of surveying. This duty is carried out by the River Survey Department of the Port Commissioners and daily surveys are made of more important localities. Some indication of the manner in which this work has expanded is evidenced by the fact that in 1882 only 58 charts and river notices were prepared, whereas, in 1932, 865 charts were prepared, of which 52,772 copies were distributed, and in addition 34,192 copies of 509 river notices were issued. The number of miles sounded was 9,600, and 268 officers and men were employed on the work. Six tidal semaphores have been provided which indicate the rise and fall of the tide on the more important bars at 3-in. intervals. Three of these semaphores indicate the rise and fall throughout the 24 hours, using a system of lights during the night. In addition, 53 gas buoys, 73 ordinary buoys, 56 shore lights and 342 river marks are maintained.

In order to obtain the maximum possible depths on the river bars the Commissioners maintain three powerful sand suction dredgers, the " Sandpiper," which was first commissioned in

The Port of Calcutta



The 60-tons Floating Crane carrying a Transporter Crane which was used in the course of constructing the New 80-ft. Lock.

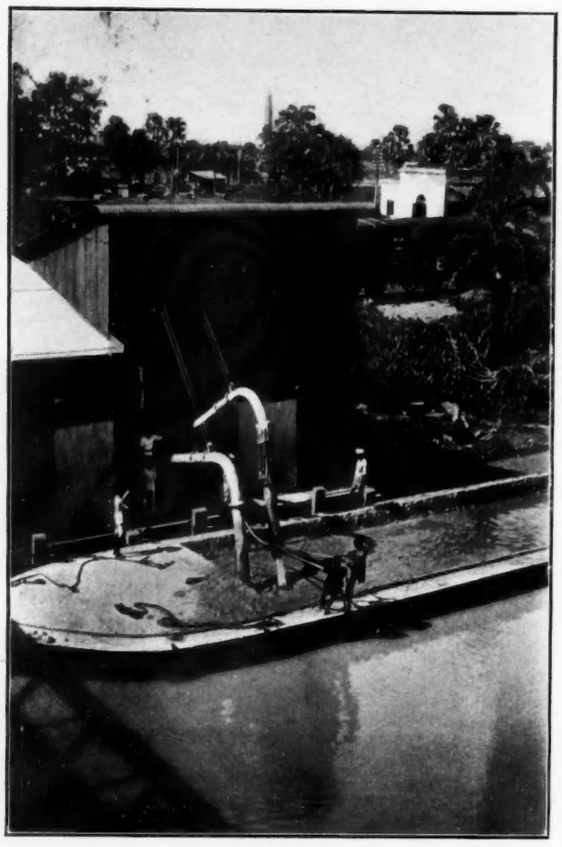
King George's Dock—Dry Dock No. 1, with a Ship about to enter.

The Port of Calcutta—continued

1907; the " Balari," commissioned in 1913; and the " Gunga," which was commissioned in 1921 to replace a dredger ordered in 1914 but commandeered by the Admiralty for war purposes. The " Balari " and the " Gunga " both contain their own hopper and are capable respectively of carrying loads of 4,000 and 5,000 tons of spoil. In favourable circumstances either of these two dredgers can fill her hopper within the hour.

The dredging of the river bars has been placed on a highly scientific footing in recent years and the average depths on two of the most important of them, i.e., the Eastern Gut and Moyapur, have been increased by approximately three to four feet since dredging was first started.

In addition to these sand suction dredgers the Commissioners own three large bucket dredgers, a jet dredger and a grab dredger for use within the port itself.



Exterior of the Pump House.

In view of the alarming rumours, which occur periodically, regarding the condition of the Hooghly, the following figures may be of interest. Prior to 1830 pilots were prohibited from moving vessels drawing more than 17-ft. at any time of the year between Calcutta and Diamond Harbour. In 1830 the limit was raised to 20-ft. and in 1860 to 23-ft. In 1870 the limit was still further increased, but only four ships drawing between 23 and 24-ft. used the river. Between 1880 and 1911 the maximum draft was increased from 25-ft. 2-in. to 29-ft. 3-in., and since then ships drawing 30-ft. and over have navigated the river on a number of occasions. In 1853, when the complete abandonment of the Hooghly for commercial purposes was being seriously considered, the largest vessel visiting the port was of 1,810 tons measurement, a figure which has subsequently risen to well over 10,000. While the Port Trust of course cannot claim the whole credit for these remarkable figures, it can fairly be maintained that by efficient surveying, systematic dredging, improved lighting and the provision of an elaborate system of navigational marks they have contributed very largely towards mitigating the difficulties of the Hooghly, and can insist that the Hooghly is anything but the dying river which it is sometimes claimed to be.

As indicated above, the pilotage of ocean-going vessels between the Sandheads and Garden Reach is in the hands of the Bengal Pilot Service. This service is a department of the Government of Bengal and is entirely separate from the Port Commissioners. The " Hooghly Pilots " have for many years been famous for their skill in handling ships under difficult conditions, and the present members of the Service fully maintain the high standards of efficiency which have been handed down to them.

Within the port itself ships are handled by Assistant Harbour Masters who are employees of the Commissioners for the Port of Calcutta. The Commissioners themselves are a public body and derive their authority from the Calcutta Port Act of 1890, an Act which consolidated the various amending Acts which had been passed between that date and 1870, the year in which the Commission was first initiated. The Board consists of nineteen Commissioners, of whom the Chairman and Deputy Chairman are whole-time executive officers. Six members are elected by the Bengal Chamber of Commerce, one by the Calcutta Trades Association, one by the Corporation of Calcutta, and " four by such body or bodies as the Local Government shall, from time to time, select as best representing the interests of the Indian Mercantile Community." The port officer, the collector of customs and the agents of the East Indian Railway, the Bengal Nagpur Railway and the Eastern Bengal Railway are members ex officio.

The duties of the Commissioners, as laid down in the Calcutta Port Act, are chiefly confined to the provision of facilities for the handling of goods, with the consequential duties of raising money to provide the necessary works and appliances, and of realising suitable rates and charges to cover the expenditure entailed. They are also required to submit to Government a proper account of the funds received and disbursed by them. Their activities under this Act are confined to Port Limits, i.e., between Konnagar and Budge Budge, a distance of 23 miles. They are, however, in addition, conservators of the port and of the navigable channels leading to it, under the Indian Ports Act XV. of 1908, an Act which consolidated the various amendments that had been made since 1875, when the first of the Indian Ports Acts became law. The Commissioners were appointed conservators in 1880. As such they are responsible for the safety and convenience of all vessels using the port and for the maintenance of the port itself and of the navigable channels leading to it.

Apart from an occasional jute mill, the first indication of the various trades centred in the Port of Calcutta, which a passenger in a steamer bound up the river would observe, is at Budge Budge, some 14 miles below the entrances to the docks. Budge Budge is the oil depot for Calcutta where all petrol and kerosene and other oils in bulk are discharged. There are six pontoon jetties at which non-dangerous petroleum and its products are discharged, and one which is reserved for the discharge of dangerous petroleum. Under the Indian Petroleum Act any petroleum oil, or product derived from petroleum, is held to be dangerous if its flash point is under 76 deg. F.

The storage installations, which have a total capacity of over 50,000,000 gallons, are owned by various companies who rent sites on land owned by the Port Commissioners. The actual pumping is done by the companies' own plant, or in certain approved cases by the tank steamers themselves. The depot is served by the Eastern Bengal Railway, but a considerable amount of oil in tins and drums is also sent away to Assam and East Bengal by river steamers.

When Budge Budge was first opened in 1886 the total yearly quantity of oil imported amounted to somewhat less than 25,000,000 gallons. In 1931-32 the figures were: Petrol, 9,419,454 gallons; kerosene, 76,670,470 gallons; batching oil, 10,207,308 gallons; fuel oil, 10,780,936 gallons; lubricating and other heavy oils, 2,410,087 gallons; but these figures show a considerable falling off when compared with the quantities imported in 1928-29 and 1929-30.

The main sources of supply are shown in gallons in the following table:—

	Burmah	America	Borneo	Russia	Assam
Kerosene ...	48,207,475	12,262,161	2,183,810	11,305,732	2,711,292
Petrol ...	4,244,830	5,174,624	—	—	—
Batching Oil	2,928,071	3,812,095	3,467,142	—	—
Fuel Oil ...	—	1,311,629	6,433,220	3,036,087	—
Lubricating and Heavy Oils	1,224,421	922,801	253,865	—	—

The Burmah-Shell Oil Storage and Distributing Co. of India, Ltd., the Indo-Burma Petroleum Co., Ltd., and the Socony-Vacum Corporation are the only companies at present dealing in bulk oil in Calcutta, but recently a number of applications have been received from Indian firms for sites for the installation of bulk oil depots. This has placed the Commissioners for the port in a somewhat difficult position, as almost all the available land at Budge Budge is occupied, and any extension of the depot could only be carried out at prohibitive cost. There are no other entirely suitable sites available with river frontage, and the Commissioners have therefore been forced to consider whether tankers carrying bulk oil could safely be permitted to enter King George's Dock and to discharge their cargo through pipe-lines to depots situated in the vicinity. Fears were expressed that if such a practice was permitted and a tanker carrying oil got on fire while within King George's Dock a disaster of the first magnitude might result, but it was eventually decided that such a risk was so slight as to be negligible and that in future petroleum having a flash point of 70 deg. F. or over might be discharged from a special jetty in King

The Port of Calcutta—continued

George's Dock and be stored in a depot situated in the vicinity. Plans are now being prepared accordingly.

Between Budge Budge and Garden Reach both banks of the river are almost fully occupied by jute mills, brick-fields, and, as Calcutta is approached more closely, by repairing slips and workshops.

The entrances to King George's Dock are situated on the left bank of the river, a short distance above Garden Reach. Immediately upstream of the entrances are the five riverside berths, with the entrance to Kidderpore Docks about one mile beyond. Throughout the length of Calcutta the deep water channel lies close into the left bank, and for this reason all the major facilities of the port are provided on that side of the river. The right bank, or Howrah side, is occupied by timber ponds, coal depots and the goods terminus of the Bengal Nagpur Railway, which is connected with the dock systems on the opposite side of the river by a wagon ferry at Shalimar. Further upstream, at Ramkristopur, the chief features of the river frontage are a series of wharves, jetties, etc., over which passes a considerable traffic in jute, rice, bricks and straw, Messrs. Burn and Co.'s workshops and the Howrah joint terminus of the Bengal Nagpur and the East Indian Railways.

King George's Dock and the Riverside Berths are the latest additions to the port and mark the completion of the first stage of the scheme of development which was decided upon shortly before the war.

During the first few years of the twentieth century the trade of the port increased so rapidly that the facilities, which in 1901 had been pronounced sufficient for all probable future requirements, soon began to appear inadequate, and in 1913 a committee, under the chairmanship of Sir William Duke, was appointed by the Government of Bengal to enquire into the facilities that then existed and to decide the best means of providing for the future. The Committee's report showed an extraordinary development to have taken place both in the tonnage and value of the goods handled by the Commissioners. For example, the value of imports had increased between 1882-3 and 1912-13 from Rs.23.77 crores (£17,827,500) to Rs.69.9 crores (£52,425,000), and the corresponding tonnage from 446,000 to 1,677,000. The question of further extending the jetty system near the upstream end of the port was rejected after detailed consideration, and it was decided that any future extensions of port facilities would have to be made in the vicinity of Garden Reach, and that the business community of Calcutta must gradually accustom itself to the main activities of the port being carried on at some distance from the business quarter of the city, rather than in its immediate vicinity, as was then the practice. To this end a large scheme of expansion was prepared, and the first item, the construction of four produce berths and one coal berth, to be known as the Riverside Berths, was taken in hand shortly before the outbreak of the war. The project was, of course, greatly interrupted both by the war and the widespread unrest which succeeded it, and the work was not completed until 1923.

The four produce berths are each capable of receiving steamers up to 615-ft. in length, and there is sufficient water to permit of the deepest draught vessels using the port to lie alongside at all states of the tide. The transit sheds are large double-storeyed buildings, the largest of them having an area of 127,000 sq. ft. on each floor. They are fully equipped with lifts and electric cranes, which will handle weights up to two tons, and the facilities for both rail and lorry traffic have been very carefully thought out. The coal berth, which takes ships up to 468-ft. in length, is a preferential berth for the British India Line (managing agents, Messrs. Mackinnon Mackenzie and Co.). It consists of a steel pile jetty, but it is not provided with any mechanical loading plant. The total cost of this portion of the work was approximately Rs.2½ crores (£1,875,000).

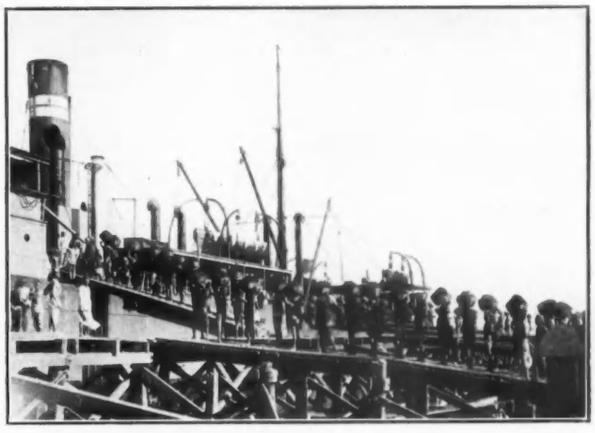
The major portion of the scheme, however, was the provision of a new wet dock system with the entrances immediately below the Riverside Berths, and, although the necessary land had been acquired and more or less detailed plans had been drawn up by the beginning of the war, work was not actually started until 1920. The entire project provided for a dock system with a total of 13 import and 16 export berths, but work was started only on the entrance locks, two graving docks, a turning basin and five berths. These were all completed by the middle of 1929, and additional berths will be constructed as occasion demands. The present trade depression has made any further extensions appear improbable for many years to come, but it is of interest to remember that in 1929-30 the accommodation provided by the new docks was fully utilised, and it appeared more than probable that work on three further berths would have to be started almost immediately. The criticisms that have been voiced in certain quarters to the effect that the new docks are an unnecessary extravagance were never heard in those prosperous days, and the critics themselves appear only to have been wise after the event.

Preliminary plans and estimates were drawn up by the late Mr. John Scott, M.Inst.C.E., on the basis of a report prepared by Sir Frederick Palmer, K.C.I.E., whom Mr. Scott succeeded as Chief Engineer to the Commissioners for the Port. These preliminary plans were referred to the late Sir John Wolfe Barry and Mr. H. Cartwright Reid, M.Inst.C.E., who were employed as joint consultants. The traffic arrangements in connection with the scheme formed the subject of a special report by Mr. T. E. Wentworth-Sheilds, who visited Calcutta with the special object of studying conditions on the spot.

Work on the new docks was commenced under Mr. J. McGlashan, M.Inst.C.E., who succeeded Mr. Scott as Chief Engineer, but shortly afterwards a special construction staff was formed under Mr. W. C. Ash, M.Inst.C.E., under whose direction the major portion of the work was carried out.

The entrance lock is 700-ft. long and 90-ft. wide, and has a depth over the sill of 24-ft. 5-in. at lowest low water level. The length of the lock can be increased to 800-ft. by using the caissons in the emergency grooves, and can be still further extended to 960-ft. by using the stop at the river entrance. In view of the fact that the river level rises above the level decided on for the wet docks, the lock has been equipped with sliding caissons, which are capable of taking pressure either from the river or from the wet docks, and the use of duplicate sets of gates has thus been avoided.

The two graving docks are built in tandem parallel to and in close proximity to the lock. They are provided with ship caissons at the river and the wet dock ends, and are separated from each other by a box caisson, so that either can be used independently of the other. The box caisson can also be used as a spare for the lock entrance. The dry docks communicate both with the river and the wet dock and can therefore be used as an emergency entrance.



A gang of coolies loading coal into a steamer at one of the labour berths in No. 2 Dock, Kidderpore.

The lock entrance caissons and both the lock and graving dock capstans and penstocks are operated hydraulically.

No. 1 dry dock has a length of 574-ft. and No. 2 dry dock of 589-ft., but by removing the centre caisson both docks can be used as one. The dry dock entrances are 80-ft. wide and the depth of water over the blocks is about 20-ft. at lowest low water level. By entering the graving docks from the turning basin, which is always maintained at a level of plus 15, or 12½-ft. above lowest low water level, vessels drawing over 20-ft. can be put into dry dock.

The first portion of the wet dock system consists of a basin of about 43 acres with a turning circle of 1,000-ft. diameter and five berths. Of these, three are equipped for import work and one for export work, the remaining berth being intended for use as a heavy lift yard. It is proposed ultimately to provide a 30-ton Goliath crane at this heavy lift berth, but meanwhile floating cranes are used to deal with the limited number of lifts beyond the capacity of the ordinary quay cranes. Each berth is 600-ft. long and can accommodate vessels drawing up to 33-ft. of water. The three import berths serve large three-storeyed transit sheds, each of which has a total floor area of 187,928 sq. ft., with, in addition, two open-sided annexes each of approximately 14,000 sq. ft. Six quay wall horizontal luffing cranes, two yard cranes and ten lifts, each of 2-ton capacity, have been provided at each of these three berths.

The export berth serves a double-storeyed transit shed with a total floor area of 153,570 sq. ft., and this also is equipped with six quay cranes and ten 2-ton lifts. All the lifts and cranes throughout King George's Docks are electrically controlled.

In addition to the five berths for ocean-going steamers, a berth has been constructed for the inland river steamer companies whose vessels ply between Calcutta and Eastern Bengal *via* the Sunderbans route. This berth consists of a timber piled jetty 350-ft. long, serving a single-storey transit shed with an area of 20,000 sq. ft.

(To be continued)

Southampton Docks

The Dock Extension Scheme and New Graving Dock

WITHIN one hundred years, the Port of Southampton, which was a comparatively insignificant harbour, with a small coasting trade, has risen to the proud position of being one of the Gates of the Empire, and the premier passenger port of Great Britain.

Nature has always been kind to Southampton. The 15 miles of approach to the docks along the Solent and Southampton Water are all land locked and sheltered from every quarter. For the most part this approach is naturally wide and deep, and where necessary it has been improved by dredging. Another natural advantage possessed by the port is the double high tide. A second high water occurs about two hours after the first. Between the first and the second high water, the sea level sometimes falls, but so slightly that the effect is that of a prolonged high tide lasting about three hours. This phenomenon is of great value for certain operations such as manœuvring a very large ship into dry dock, a process which occupies an hour or more, and calls for quiet water while it is being carried out. Another advantage is the moderate range of tide (13-ft. at springs—8½-ft. at neaps), which makes it possible to do away with locks, and to lay all vessels at tidal quays without any difficulty.

But in spite of these natural advantages, the remarkable growth of the port dates from 1842, when the first deep water dock was opened and connected with the London and Southampton Railway so that passengers and cargo could for the first time be landed and sent to London safely and quickly. These facilities at once brought Southampton into prominence, and it is largely due to the fact that they have been vigorously developed by the Southern Railway, and its predecessor, the London and South Western Railway, that the port has drawn ahead of many of its rivals.

The Older Docks.

The earlier docks were built on a peninsular containing about 240 acres of mudland at the confluence of the Rivers Itchen and Test. Here various deep water quays, amounting in length to about 4 miles in all, have been built, giving about 40 berths for ships of various sizes, together with dry docks and other facilities. This estate was developed to its full extent just before the war, and enabled Southampton to perform a splendid work as the principal port of embarkation for troops. After the war, the demand for accommodation for more and bigger ships still continued, and it was therefore necessary to acquire additional land and embark on what are called the Southampton Dock Extensions, but what is virtually a new scheme.

The New Extensions.

The site of this scheme was a bay on the River Test, about 2 miles long and half-a-mile wide, and extending from the Royal Pier upstream to Millbrook Point. It consisted of a mudland, covered at high tide but bare at low tide.

The scheme includes the construction of a quay wall about 1½ miles long and running about east to west; and on the south side of the wall the dredging of a deep water channel and berths for eight big ships in line; and on the north side of the wall the reclamation and raising of about 400 acres of the mudland. It is intended to use the reclaimed area, not only for such dock accessories as quay space, sheds, warehouses, roads and rail sidings, but also it is hoped for the establishment of factories and depots which naturally grow up round a deep water dock. The scheme also includes the construction of a very large graving dock at the west end of the bay.

It is intended at some future date to construct a large jetty, parallel to the new quay, which would give accommodation for another twelve big ships—and also a second dry dock alongside the first.

The Dredging.

The dredging of the approach channel and berths was carried out by Messrs. James Dredging, Towage and Transport Co., Ltd., of Southampton. The work included the formation of a channel about 2 miles long and at least 600-ft. wide for the existing turning basin off the Ocean Dock up to the eastern end of the new quay wall and throughout its length; with wide turning basins at each end of it. The bulk of the channel is dredged to 35-ft. below L.W.O.S.T., but immediately alongside the quay wall the berths are dredged to 45 and 40-ft. below L.W., so that ships drawing more than 35-ft. can lie afloat at all states of tide. The work involves the removal of about 20,000,000 tons of earth of various kinds.

The whole of the work is being carried out by means of bucket ladder dredgers filling into barges, but the subsequent disposal of their contents varies with the nature of the material itself. This part of the estuary was overlaid with a bed of soft clayey mud, about 8 to 15-ft. thick. This was considered to be quite useless, and was therefore filled into bottom door barges and taken to sea. The principal dumping ground is about 2 miles south of the Nab Tower at the eastern entrance to the Solent, so that a return journey of about 50 sea miles is involved. Below the mud the estuary is, fortunately, overlaid with a stratum of gravel varying in thickness from about 2 to 7-ft. Great care is taken to dredge this separately as far as possible from the strata above and below it. It is filled into barges which are brought ashore and dumped or unloaded either for making banks or for concrete.

Below the gravel are sands and sandy clays, which also are filled into solid bottom barges, which are brought alongside one or other of the reclamation vessels, and there transferred by pumping through pipe lines on to the area to be reclaimed.

Reclamation Banks.

Before attempting to carry out this pumping operation, however, it has been necessary to completely exclude the tide from the area to be raised. For this purpose, the whole area of 408 acres has been divided up into four different "basins," bounded on the north, east and west by the previously existing foreshore, on the south by the main bank which runs east and west along the site of the new quay wall, and sub-divided by three cross banks. It would perhaps have been physically possible to have reclaimed the whole 408 acres as one basin by enclosing it with one long main bank. But the area was in fact divided up into four for the following reasons. A basin of 18 acres was first enclosed and raised at the east end of the area so as to form a working yard for the use of the contractors in building the quay wall. Next a second basin of about 177 acres was enclosed, as at that time it was intended to restrict operations to about half the present scheme, and later on the enclosing of a third basin of about 165 acres was undertaken, and finally a fourth containing about 48 acres and including the site of the graving dock.

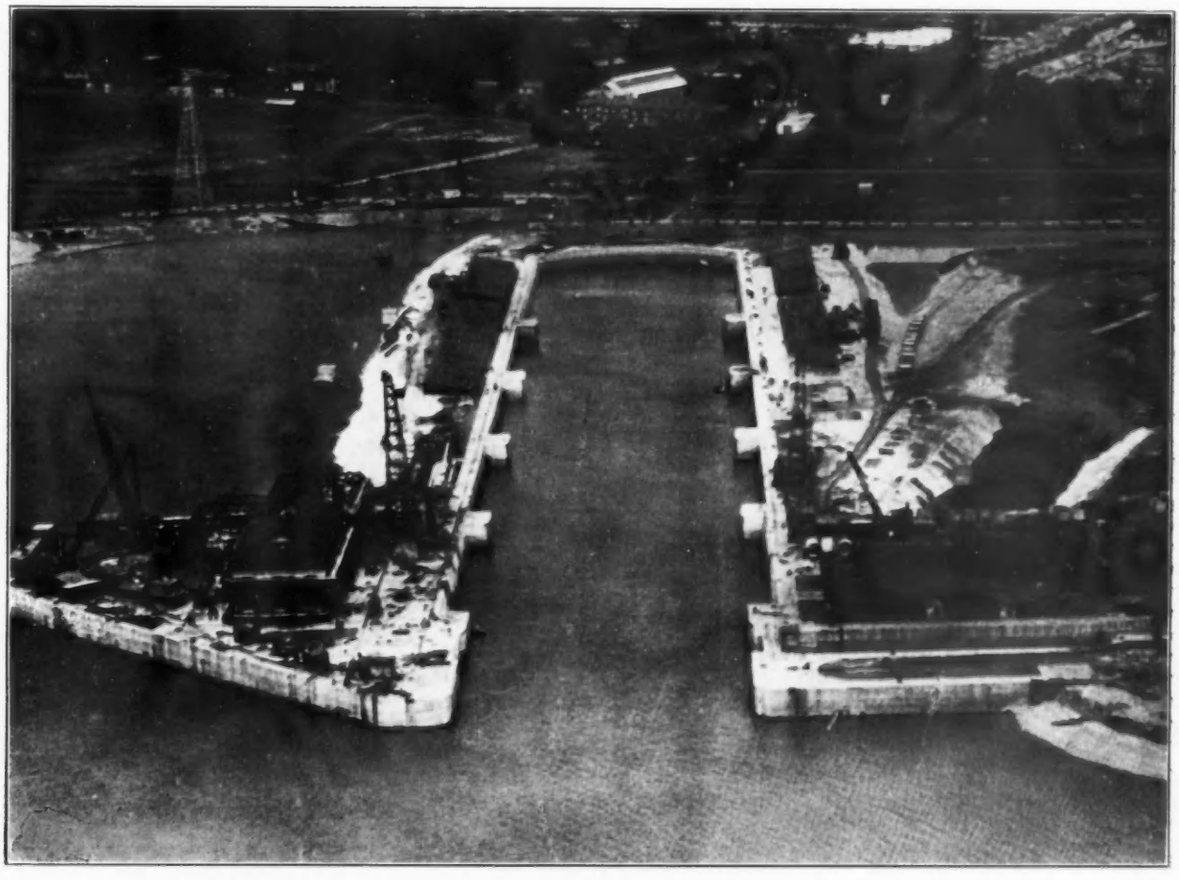
The main bank was made of dredged gravel throughout, and for the most part no less than 167-ft. wide on top. This width was of course greater than was needed for reclamation purposes, but was adopted to facilitate the construction of the quay wall, as will be explained later. In order that it should be stable, the soft mud was first removed by dredging along the site of it down to the virgin gravel, and the bank was then built up to about the level of low neap tides by dumping dredged gravel from bottom door barges into the cut thus formed. Above that level the bank was built up to well above the highest tides by means of a special floating transporter which was moored alongside the site of the bank. It consisted of a bucket ladder dredger mounted on twin pontoons connected by overhead framing and spaced far enough apart to allow a barge of dredged gravel to be brought in between them. The chain of buckets lifted the gravel and passed it on to an endless belt working on a long cantilever arm, also supported on the pontoons, and which are projected shorewards. Thus the belt delivered the gravel over the top of the bank. When sufficient gravel had been thus poured, it was levelled off by hand, and its seaward face formed to a slope of 2 to 1, which was then protected from wave action by covering it with a cloak of fascines.

One cross bank was built up in the same way, but the other two were built of chalk brought down by rail from the Railway Company's quarry at Micheldever. The chalk was transported in drop-sided wagons, and to enable it to be unloaded in situ, a temporary timber viaduct was first constructed on the site of the bank. This consisted of round fir piles, driven with an overhanging engine and braced together with transverse and longitudinal timbers on which were laid the rails which formed the wagon road.

Before closing the bank, it was necessary to provide a set of sluices through which the tide could pass into and out of the reclaimed area without scouring the banks at each end of the gap. These sluices consisted of a sufficient number of 10-ft. openings separated by piers, each consisting of a single row of inter-locking steel sheet piling, 26-ft. long and standing well above high water level. The piers were connected by a sill, also consisting of inter-locking steel sheet piling, driven down to 4-ft. below low water. When the rest of the bank was completed, the sluices were quickly closed by dropping into the sluice openings, a set of 10-ft. wooden shutters.

Southampton Docks

The Royal Yacht entering the Graving Dock, the banks of which were lined by large crowds.



An Aerial View of the King George V. Graving Dock, the largest of its kind in the World.

Southampton Docks—continued

Reclamation by Pumping.

The raising of the enclosed areas is now being carried out by means of two special reclamation vessels which are moored alongside the main bank, and which are provided with the necessary pumps. The solid bottom barges which have been filled by the dredgers with sandy clay are brought alongside one or other of these reclamation vessels, and sufficient water is pumped into the barge to enable the earth to be pumped ashore. The material thus diluted is picked up by the suction of the reclamation pump, and sent ashore through a 24-in. pipe line. The pipe line is lengthened as required up to something like half-a-mile. The ground is raised in this way to an average height of about 10-ft. The superfluous water from the pipe line finds its way back to the river through sluices provided for the purpose.

Quay Wall.

The quay wall is being built by Messrs. Sir Robert McAlpine and Sons (London), Ltd., of London. It consists essentially of a long line of 146 concrete monoliths, each 45-ft. square on plan, and sunk to depths varying from 71-ft. to 100-ft. below quay level. Each monolith is provided with nine shafts, or wells, of octagonal form and about 10-ft. in diameter. The cutting edges are stiffened by means of a steel plate shoe, 5-ft. deep, and the concrete within this shoe and for a height of 10-ft. above it is heavily reinforced. Above that again the monoliths have been built partly of mass work and partly of blockwork, secured to some extent by vertical and horizontal tie rods. The excavation for sinking is carried out by means of 1½ yard grabs handled by 15-ton derrick cranes. The sinking of the monoliths is assisted by kentledge in the form of 4½-ton cast iron blocks. A monolith of standard height weighs something like 5,000 tons, but it is generally necessary to add 3,000 or 4,000 tons of kentledge in order to sink it.

As mentioned above, the line of monoliths was placed on the main bank which was constructed to a top width of 167-ft. The principal reason for making this bank so wide was in order that it should accommodate the cranes and service tracks used in connection with the building and sinking of the monoliths, and the ample space given by the adoption of such a wide bank has proved to be a great help in the matter of rapid progress. Incidentally, this wide bank is a very important contribution to the stability of the wall, as of course the gravel is a far more stable backing than the mud which was removed to make room for it. When a monolith reaches the required depth, any loose material was cleaned out with a plate grab, and the walls are all filled up with mass concrete, deposited through the water in bottom door boxes, to a height of at least 15-ft. above the cutting edge. The three back wells are completely filled with sand, but the other six wells are simply left full of water, the object being to throw the centre of gravity of the whole mass as far back as possible. Between adjacent monoliths is a gap, which at first was limited to 4-ft., but was later increased to 7-ft. in order to facilitate control. These gaps are not filled with concrete, but some of them are closed at the back of the monoliths by driving down very heavy inter-locking steel piling.

Along a greater part of the length of the wall in order to reduce the lateral thrust of the earth and water behind it, a certain amount of backing has been removed, and the void thus formed has been covered with a platform of heavily reinforced concrete slabs. These slabs are each 38-ft. long, 8-ft. wide and 4-ft. thick. The seaward ends of these slabs rest on the monoliths themselves, and the shoreward ends on a row of reinforced concrete piles.

The wells of the monoliths, and the gaps between them, are covered by reinforced concrete slabs placed at a level of about 6-ft. below quay. A continuous concrete face wall is then built above the monoliths, which in fact extends down to 10-ft. below quay. But before doing so, so much of the bank as projects beyond the face of the quay wall is dredged away, and indeed, this dredging is carried down to its final depth in order that any inevitable settlement or tilting of the monoliths may take place before the continuous face wall is built. The 6-ft. space above the monoliths is for the most part filled in with gravel, on which the railroads are laid. An 18-ft. gauge track is also provided for the quay cranes. This track, in order to prevent settlement, is supported on concrete walls carried down to the monoliths. The quay is finished off by being paved partly with lightly reinforced concrete and partly with tar macadam, the latter material being used where railroads exist which may require to be lifted and packed in the near future.

Cargo Sheds.

Cargo sheds for two berths have already been erected, and sheds for the other six berths will be put in hand. The two sheds which have been built are in one continuous building, 1,650-ft. long and 150-ft. wide, and divided by a large waiting room which will serve both sheds. They are single-storey buildings with walls of reinforced concrete and brick. The roof consists of double cantilever steel trusses resting on two rows of braced steel columns supported on reinforced concrete piles. It is covered with columbian pine boarding and bituminous felt. Roof glazing is freely introduced, and over about half the length of each shed a balcony is introduced overlooking the quay. The floor of the sheds slopes up from quay level in front to 3-ft. above quay level at the back, so as to be platform high where the principal railroad occurs. The floor is made up with earth filling and paved with lightly reinforced concrete so as to be capable of accommodating motor lorries if necessary.

Besides the rail track at the back of the shed mentioned above, there is another track in front of the shed and two tracks on the quay, and three outside at the back of the shed. Beyond that again is a vehicular road, 40-ft. wide, which will run the whole length of the new quay and thus serve all sheds.

Graving Dock.

The construction of the graving dock has been carried out by two firms working jointly, viz.: Messrs. J. Mowlem and Co., Ltd., of London, and Messrs. Edmund Nuttall, Sons and Co., of Manchester. It is 1,200-ft. long, 135-ft. wide at entrance, and 59½-ft. from cope to floor. The keel blocks are 4½-ft. high, and there will thus be a depth of water of 45-ft. over them at high neap tides. The cill is 2-ft. lower than the blocks. The usual high level altars have been dispensed with as it is found that the large ships usually dock on three lines of blocks, and do not require shoring. The walls of the dock, however, are constructed with a batter of 1 in 4 for the purpose of stability. In order to prevent the bilge keels of vessels touching the foot of the battered wall, vertical buttresses project from the wall at intervals of 200-ft. Access to the bottom of the dock is provided by eight flights of steps and two timber slides. The dock is closed by means of a sliding caisson, which, when a ship is to pass in or out, is drawn back into a special recess by means of an electrically driven winch. The caisson is of steel throughout with Greenheart meeting faces. It is 138½-ft. long on the centre line, 58½-ft. high and 29½-ft. wide. It is designed to be double acting, so that in addition to keeping water out of the dock, it can hold up the level of the water inside the dock while the tide is falling outside. Moreover, if necessary, it can be floated out and placed against an emergency stop outside its usual position in case the other stops or the recess need to be examined or repaired. The caisson has been built by The Furness Shipbuilding Co., Ltd., of Haverton Hill-on-Tees.

Pumping Plant.

The pumping plant, which is housed on the western side of the dock, has involved a good deal of planning, as provision has had to be made for both dewatering and impounding not only the new graving dock, but another dock which will be built alongside it at some future date, and also for ejecting storm water which falls on to the dock estate at times when this becomes too voluminous to discharge by gravity. Pumps are also being installed by providing circulating water to ships, for fire-fighting and other purposes.

All pumps are of the centrifugal type and driven by electric motors. For dewatering and impounding, four 54-in. vertical spindle pumps are provided, each driven by a 1,250 h.p. synchronous induction motor, running at 272.3 r.p.m. These four machines are designed to eject the 260,000 tons of water, which the dock contains, in four hours. For dealing with soakage water, three 16-in. vertical spindle pumps are provided, each driven by a 200 h.p. motor running at 585 r.p.m. These pumps are primed by two 4-cylinder reciprocating exhausters driven by 30 h.p. motors running at 950 r.p.m.

All pumps, great and small, are provided with suction and discharge valves, so that each can be isolated for dismantling and repairs. The discharge valves for the main pumps, which are 54-in. in diameter, are specially designed to close automatically if the supply of electricity fails, and reflux of water, with consequent damage, is thus prevented.

The system of valves and pumps is complicated, and in order to simplify procedure, all are operated by one man from a central control desk, which contains an indicator diagram showing by coloured lights whether the pumps are working or standing, and whether the valves are open or closed.

The main contractors for the pumping installation have been Messrs. Gwynnes Pumps, Ltd., of London and Lincoln; Messrs. Glenfield and Kennedy, Ltd., have provided the valves and Messrs. The General Electric Co., Ltd., the motors. The control gear has been made by Messrs. Electric Control, Ltd., of Brighton, and the distance indicating apparatus by Messrs. Evershed and Vignoles, of London.

Equipment of Dock.

The dock will be equipped with two travelling electric cranes, one on the west side capable of lifting 50 tons, and one on the east side capable of lifting 10 tons. The equipment will include

(continued on page 309)

Book Review

Jahrbuch der Hafenbautechnischen Gesellschaft, Vol. XII—1930-31, V.D.I. Verlag Gm 6.H., Berlin N.W.7—1932; 294 illustrations, 2 portraits and 11 tables: 327 pages.

THE Twelfth Year Book of the Harbour Technical Society has just been published. It maintains the usual high quality of typography and text material which has made these annuals the outstanding publications in any language in the field of port terminal and waterway engineering. The publication of this splendid volume at this time is an achievement in the face of great financial difficulties common to all engineering societies.

The book may be procured through the Secretary of the Hafenbautechnischen Gesellschaft, Baurat Baritsch, Dalmannstrasse 1, Hamburg, Germany. The annuals come automatically to members of the Society. Eligible to membership are port terminal engineers and public port officials. Membership dues—including the annual—are about $7.00 a year in U.S. currency.

This annual contains very interesting discussions by outstanding authorities. The material is grouped under three heads:—

I.—Business Reports.
II.—Papers read at Annual Conventions.
III.—Contributions of Special Articles.

The frontispiece is an engraved portrait of the late Dr. Eng. Ludwig Wendemuth, for many years Director of the Port of Hamburg, with which he was connected since 1884. As the right hand of the late Dr. Bubendey, he is the real builder of the Port of Hamburg and its directing genius since Dr. Bubendey died, in 1919. His passing is a loss to all port and terminal engineers and officials the world over.

Under the group " Papers Read " are several very interesting subjects, especially Paper No. 1, by Baudirektor Sieveking, of the Port of Hamburg, with verbatum record of discussions upon the subject, giving opinions from the floor by many well-known authorities.

1. " One - storey or Many - storeyed Transit Sheds."—Explanations of terms and functions, economic analyses of different types, conditions necessary to permit uninterrupted use of quay and berths. The necessary floor area of transit sheds based upon experience in practice. A list of advantages and disadvantages of both systems. Conclusion: that from the operating and business return standpoints the single-storey transit shed is more advantageous. The multi-storeyed structure, transit shed floor on ground floor and upper floors for warehousing, is advantageous where harbour areas are restricted, land values very high, subsoil suitable and traffic concentrated and of high value, to support adequate fees.

2: " Port Warehouses," by Stadtbaurat Dr. Eng. Fabricius, Chairman of the Port of Stettin Authority. There follows a discussion of three possible systems:—Type 1: Warehouse separated from transit shed; type 2: warehouse separated but part of the transit shed layout; type 3: warehouse and transit shed floor in the same structure.

Type 1.—The Hamburg system of warehouses in a separate group is an example of system No. 1. Cargo is moved between warehouses and transit shed and/or ship by lighters.

Type 2.—Warehouses directly in the rear of the transit sheds and part of the terminal quay unit has many examples: Stettin, Bremen (Germany), Gotenburg, Malmoe (Sweden) are a few.

Type 3.—With the ground floor a transit shed and the upper floors for warehouse space, is illustrated by the Port of Manchester and the Gladstone Docks, Liverpool, the Stettin Freeport, the Levante Quay, Amsterdam, and many other examples.

The three types are analysed from engineering, operating and economic viewpoints. The discussions are as interesting as the set papers, with such famous harbour engineers participating as Dr. De Thierry, chairman; Dr. Dronke, Director of the Bremen Warehouse Company; Kaidirektor E. G. Buschmeyer, Hamburg; Tillmann, Port of Bremen Port Authority; the Kromans, Port of Rotterdam. These discussions are illuminating in view of the personnel of the members entering the discussion. De Thierry summed up the discussions by the statement that the choice of the three methods depended upon local conditions and circumstances. This means that the specialist in terminal engineering capable of estimating the best type of terminal layout to serve a given situation is still necessary, because a fixed rule cannot be rigidly applied.

Under " Contributions " (Part VIII.) several are notable.

1.—" The New Transfer Terminals for Bulk Commodities at the Seaport of Dordrecht, Holland," by H. Versteeg, of the municipal authority of Dordrecht. The interest in this paper is the detailed description of methods of quay wall construction by means of precast cellular caissons, launched and towed to site and sunk. The handling bridges for coal, ore, etc., are similar to the installations on the Great Lakes.

2.—" The Extensions of the J. P. Coenhafen at Amsterdam," by Eng. E. Van Heemiskerck, Van Beest, Amsterdam. This paper is fully illustrated with detailed measurement drawings, a coloured plate insert map of the Port of Amsterdam.

3.—" Two Examples of Ocean Vessel Quays in Direct Connection with Basins for Inland Waterway Vessels," by Baurat Baritsch, the Secretary. These two terminals for direct interchange between inland and ocean vessels are very interesting solutions of the given problems. One terminal is located in Nordenham and one in Osaka. Bulk commodities are handled at both examples.

4.—" The Steel Plant Harbour of Friedrich Krupp, A.G., on the Rhine-Herne Canal," by Baurat Dr. Eng. Ostendorf, Munster, in Westphalen. This gives full details of layout, construction and equipment. Special details and discussions of the footings for the crane rails of the huge bridge cranes are interesting. Also details of mooring dolphins and breasting-off booms, to hold the ship in deep water at the foot of the revetted sloping canal bank. This is another example of the principal that very expensive vertical quay walls are not necessary in industrial harbours.

5.—" The Coal Transfer Ports of the New Wessel-Datteln Canal," by Civil Eng. Hans Meiners Essen-Bredeney.

6.—" Experiences with Wave Action in Constructing the Port of Helgoland," by Director of Naval Yards and Docks Eckhardt, of Wilhelmshafen (Naval Base). The graphic material and wave force measurements are scientifically developed and are a most valuable contribution to the very difficult problem of wave action against marine structures.

7.—" Ground Swells and Their Relationship to the Design of Harbour Breakwaters," by Dr. Eng. G. De Thierry, Technische Hochschule Berlin-Charlottenburg. Deeply scientific, as everything De Thierry investigates, he opens his discussions upon the " Cornaglias Theory of the Neutral Line," and Gaillard's 30-year-old work, " Wave Action in Relation to Engineering Structures." Following the discussions of the action of waves and ground swells, is a fine collection of breakwater cross-sections with analytical discussions of their merits or defects. This paper is a most valuable contribution to this most very difficult type of engineering structure.

8.—" Various Launching Methods for Reinforced Concrete Caissons, with Special Consideration of Construction upon Floating Dry Docks," by Dr. Eng. Volker Behrendt, Hamburg (a Dr. Eng. dissertation made under Prof. Dr. Eng. A. Hertwig and Prof. Dr. Eng. G. De Thierry). This is a very technical discussion of floating stability, etc., with full mathematical calculations.

Papers read at the 1931 meeting:—

1.—" Operation of the Port of Emden," by L. Schulye.

2.—" Shore Protection Construction of the East Friesland Islands, from Borkum to Spiekeroog," Oberregierungsrat Franz Aurich. The construction of shore groins by masonry and steel piling methods are fully illustrated.

3.—" Port Administration at home and abroad," pp. 181 to 227 inclusive, by Oberbaudirektor Dr. Eng. Lohmeyer, of the Port of Hamburg. This discussion in much detail, with great depth of discernment, based upon Dr. Lohmeyer's years of practical experience in the administration of one of the largest and perhaps the best laid out and administered seaports on the earth, makes his comments worthy of close attention and consideration. He discusses this familiar and vital subject under the following headings:—

I.—The authorities in charge of port administration.
II.—Problems of port administration and the boundary between private enterprise: land ownership, port sovereignty, eminent domain, police authority, etc., quarantine, harbour masters.
III.—Harbour structures: (a) water areas; (b) entrance channels; (c) terminal structures.
IV.—Harbour railway.
V.—Transfer (a) open storage; (b) bulk commodities; (c) transit sheds (i) owned and operated by port authority, (ii) transit sheds built by the port authority and leased to operators, (iii) private transit sheds, (d) floating transfer equipment.
VI.—Warehousing and storage.
VII.—Stowage (stevedoring).
VIII.—Pilotage.
IX.—Miscellaneous private harbour enterprises: practical demarkations of functions between public and private enterprise.

4.—A. Forms of Port Authority Organisation: (1) public officials without participation by private individuals; (2) public officials assisted by advisors representing private enterprise; (3) public officials and representatives of private enterprise; (4) port authorities in form of corporations; (5) public officials and quasi-public bodies; (6) independent port administration as trustees of the public interest; (7) private ports.
B. Comparison of various forms of port administration.

After the discussions follows a long appendix, giving an analysis of individual ports.

Book Review—continued

I.—Germany. A. State ports: (i) Hamburg; (ii) Bremen; (iii) Lubeck; (iv) Emden; (v) Bremenhafen; (vi) Cuxhafen; (vii) Harburg-Wilhelmsburg; (viii) other State of Prussia ports; (ix) State railroad ports.
B. Municipal ports: (i) Kiel; (ii) Flensburg; (3) Berlin; (iv) Magdeburg; (v) Worms; (vi.) other municipal inland waterway ports.
C. Co-operative ports (Hafengemeinschaften)—state and municipal: (i) Duisburg-Ruhrort (state and city); (ii) Stettin (state and city); (iii) Konigsberg (state and city); (iv) Hamburg-Prussian Port (two states); (v) Fisheries Port Wesermunde Bremerhafen G.m.b.H. (Ltd.) (two states); (vi) Wanne (two cities); (vii) Wilhelmshaven (mixed).

II.—Danzig.

III.—Netherlands: (i) Rotterdam (city); (ii) Amsterdam (city); (iii) Ijmuiden (Ymuiden), state fisheries harbour; (iv) Provinsialhafen Delfzijl; (v) Sonstige Häfen, etc.

IV.—Belgium: (i) Antwerp (part city and part state); (ii) Ostende (state and city); (iii) Brussels (stock company—stocks owned by State Belgian Government, City of Brussels, Province of Brabant, and several suburbs of Brussels); (iv) Bruge-Zeebrugge (City of Bruge, Province of East Flanders).

V.—France—all ports are federal, except the autonomous ports of Le Havre, Bordeaux and Marseilles, which became autonomous under the laws of 1925. Federal ports are under the French Corps of Engineers, in Paris (Les Ingenieurs des Ports et Chaussees).

VI.—Italy. B. Independent ports: (i) Genoa—independent company (Consorzio Autonomo, founded 1903), built by loans from city and central governments; (ii) Venice, originally a railroad port; administration divided.

This list continues for Portugal, Sweden, Norway, Denmark, Roumania, Great Britain, Canada, South Africa, British India, Dutch East Indies, United States of America. The essential features are covered in a short paragraph for each port. For a number of large ports graphic organisation charts are included, showing very clearly the inter-relationship of various branches of port administration. This is the best survey of the important question of Port Administration which has appeared to date. The paper is fully supplied with foot notes and a reference bibliography. It is interesting to note that Dr. Lohmeyer made full use of American publications, " World Ports," " Port Series " (monographs for various ports), " Port Development " and many others. How many of our port administrators are equally familiar with the original sources concerning other seaports of the world?

III.—Contributions.—1. " The Improvement Construction of the Dortmund-Ems Canal," by Ministerialrat W. Paxmann. This canal, 270 kilometres (168 miles) in length, is an important transportation highway for the Ruhr industrial area, as a connection with the Port of Emden, a shorter and less expensive route than the old River Rhine path to Dutch ports. It was constructed during the last quarter of the eighteen hundreds for 600-ton capacity barges. It is being improved to carry barges of 1,000 tons capacity. The south section has three, the north section fifteen, locks. The capacity is estimated at 4,500,000 metric tons (1 metric ton equals 1.1 long ton). After the improvements, a capacity of 7,800,000 metric tons, or about 10,000,000 short tons (U.S.A.) will be possible. The canal prism has a 37 metres surface width, bottom width 27 metres (127-ft.) for 2 m. drafts (6.56-ft.), and 19 m. width (62.33-ft.) for 3 m. drafts (9.84-ft.). Barges with a beam of 9 m. (29.9-ft.) are in a relationship of 1:3 to the canal bottom width. This is not wide enough for a continuous two-way traffic which will become necessary with the rapid growth of traffic of the Midland Canal (Mittellandkanal), which will reach 10,000,000 metric tons. This will call upon the south section of the Dortmund-Ems Canal to handle 15,000,000 metric tons as connecting link between the Ruhr district, the Port of Emden and the Midland Canal. The prisms have a surface width of 50 metres (164-ft.) to 56 metres (183.7-ft.), 4.5 metres (14.8-ft.) clearance under bridges and a depth of 3.5 metres (11.44-ft.) to accommodate 1,500-ton barges 82 m. by 9.6 m. by 2.5 m. (269-ft. by 31.5-ft. by 8.2-ft.).

As the prisms will not permit continuous two-line traffic with safety and at normal speed, and as it would cost a great sum to move the dyke banks, the project is to drive sheet piling from the first surface berm on one side of the canal and dredge the full bottom width of about 24 metres (78.7-ft.) by eliminating the 1:2.5 slope of the bank to be provided with the vertical bulkhead. All fixed works such as culverts under the canal are to be relaid to permit a future depth of 3.5 metres (11.4-ft.), and all bridges, of which there are 90, must be raised to a vertical clearance of 4.5 metres (14.7-ft.).

This paper is of special value to those interested in the improvement of the New York State Barge Canal.

One important part of this paper is a study of decreased ton mile costs by the accommodation of barge units of greater carrying capacity. The most efficient Rhine barge is 2,000 metric tons to 2,800 metric tons capacity. Compared with a smaller Rhine barge of 1,800 to 2,800 tons capacity, in the restricted canal the costs of operation are higher.

A 1,000-ton canal barge would show a 62.8 per cent. increase in ton mile costs.

A 1,400-ton canal barge would show a 46.7 per cent. increase in ton mile costs.

A 2,000-ton canal barge would show a 29.5 per cent. increase in ton mile costs.

Compared with a 2,000 metric ton capacity Rhine barge, a 1,000-ton canal barge would show a 70.7 per cent. higher cost.; a 1,500-ton canal barge would show a 49.8 per cent. higher cost, and a 2,000-ton canal barge would show a 35.7 per cent. higher cost.

Judging from the types of barges most in use upon connecting canals, the majority of barges upon the enlarged canal will be of 1,250 metric ton capacity, 80 metres (262.4-ft.) long, 9.5 metres (31.1-ft.) beam, 2.30 metres (7.66-ft.) draft. Loaded to 2.5 metres, this barge will carry 1,350 tons.

The total cost of improvement of the Dortmund-Ems Canal is estimated to be 250,000,000 RM. ($62,500,000), based upon 1928 prices.

This entire paper is of great scientific interest to all persons interested in barge canals as to facts and also as to scientific methology in the estimate of the situation.

2.—" The Second Port Basin for Scheveningen," by Ing. A. Meyers, Chief Engineer of the Department of Public Works of the Hague (s'Gravenhage). This basin is faced by gravity concrete quay walls, cast in place in the dry and the dock basin area excavated to project depth in the dry before letting in the ocean. Due to great tidal variations, this basin is a wet dock with a lock chamber entrance. The basin is provided with five slipways for haul-out of fishing vessels. The contribution is fully illustrated and contains some interesting engineering features. The basin is primarily a fisheries harbour. Shore structures for icing, cleaning, shipping and auctioneering of fish are provided.

3.—" The Passenger Terminal at Cherbourg and the Quay Wall Construction," by Direcktor Dipl. Ing. E. Blank, of Christiani and Nielsen, Hamburg Engineers.

With a great sigh of relief—" At last." Was there ever a port in the world which treated high-class passenger travel worse than Cherbourg did for years? This excellent paper, fully illustrated with working drawings and photographs, has much of interest as to lay-out, structural design and execution under very bad storm wave conditions and the interesting modernistic architectural treatment of the passenger station. Passengers are transferred between ship and second story passenger deck over a very elaborate travelling gantry gang plank, with adjustable elevation and telescopic extension.

4.—" Modern Crane Installations at the Port of Dunkirk," by the Machinenfabrik Augsburg-Nurnberg, A.G., fully illustrated with drawings and capacity and performance tables.

5.—" New Cranes in French and Belgian Ports," by Demag. A.G. Duisburg, the great crane building firm. The entire tendency in crane construction for merchandise wharves and dry docks is to the rocking type with luffing outer section, rather than the old revolving type with stiff booms. The paper covers also a number of bulk cargo installations of interest, but in general of the standard Great Lakes bridge types. Two floating cranes with Diesel electric power, one of 30 tons for Toulon and one of 40 tons for Antwerp, one of 150 tons for Marseilles, are the most interesting new units. The test lift of the Marseilles crane was 187 tons.

6.—" Earth Resistance Against Anchor Plates " (in bulkhead tie-backs), by Dr. Eng. Wilhelm Buckholz. This very careful study, based upon a series of meticulous experiments, was accepted as the author's Doctor of Engineering thesis at the University of Hanover. It was done under two famous professors in the field of Port Engineering, Professor Dr. Ing. O. Francis, the great writer in this field, as referent, and Professor Dr. Ing. H. Kulka as co-referent. The work is a valuable contribution to the knowledge of this modern form of anchorage for bulkheads and quay walls. The reviewers' preference is for large areas of sheet piles for anchors rather than the plates of this talented young engineer's experiments. But this does not alter the value of this scientific contribution. The sheet piling sheet anchor, as used in the quay walls of the Kuhwarder Basin, Hamburg, are statistically analysed. The conclusion of the dissertation contains a bibliography, listing 37 references to recent studies of anchor plates for tie-back anchors for bulkheads and quay walls. A most valuable source reference. All these sources are in German. The works of Dr. Terzaghi, now Professor of Soil Mechanics at M.I.T., are listed, " Erdbaumechanik and Boden Physikalischer Grundlage "—Verlag Deuticke, Vienna, 1926.

The Twelfth Year Book of the Harbour Technical Society is a gold mine of information in the field of port and canal construction and administration and another priceless contribution to the reference literature of this extremely specialised field.

R. S. MACELWEE.

Notes from the North

Ribble Navigation.

MEMBERS of the Preston Town Council recently made their annual inspection of the Ribble waterway and its equipment, under the leadership of Mr. A. H. Howarth, the new Ribble engineer, and Mr. J. G. Merriweather. This was Mr. Howarth's first inspection as Ribble engineer. Plans of the river in the last three years enabled visitors to see changes in the deep channel. Mr. Howarth reported that the highest point in the bed of the river from January to July this year had ranged from 2-ft. 4-in. to 4-ft. 8-in., which averaged 3-ft. 6-in. above sea low water. This was 9-in. higher than the corresponding period of last year. Compared with the corresponding period last year, the sand level in the bed of the river during the past six months had shown a heightening of 10¾-in. in the upper half and lowering of 4¾-in. in the lower half. The heightening was accounted for by the long, dry period, and the consequent absence of freshets necessary to scour the bed of the river in the upper half of the upper reaches. Owing to the absence of freshets and the partial silting, mainly in the mile below the dock entrance, additional dredging plant had to be put to work. Deepening of the upper reaches ceased in 1926, since when only maintenance dredging had been carried on. From the 8½ to the 11 miles point from the dock entrance the water area between the training walls showed very little alteration for the past few years. The extension of the south training wall commenced in May last year, had been continuously proceeded with since. The members of the Council first inspected the dock offices, and then split up into two parties, one going to the sand pump, and the other by a tug to the bucket dredger. They saw these in commission, watched the sand dropped into deep water at sea—more than 1,300 tons of it. The clay taken into the bucket dredger is being used to build the training wall which in time will straighten the entrance channel. It is only when the tide is fully out, revealing the vast acreage of sandbank near the river mouth, that the difficulties of the Ribble authorities can be realised. A huge sandbank bars a straight deep entrance channel to the river.

Ramsey Swing Bridge.

At the Manx Tynwald, when the Harbour Commissioners' vote was under discussion, Mr. Alcock urged that the swing bridge at Ramsey should be taken over and maintained by the Harbour Commissioners. It was the only bridge which had been erected and maintained by a local authority, at considerable cost, and it was, he considered, quite time that the public of Ramsey were relieved from the upkeep. It was costing the town a fourpenny rate. Mr. Crellin, a member of the Board, stated that no application had ever been made to the Board to take over the bridge.

Mersey Dock Board Returns.

The weight of the goods discharged and, or, loaded in the docks of the Mersey Docks and Harbour Board for the year to July 1st, was approximately 12,300,000 tons.

This interesting fact is mentioned in the annual comparative statement of the number and tonnage of vessels which have paid rates to the Board, together with the amount of rates and dues received on vessels and goods, for the two years ended July 1st, 1933. This shows that the number and tonnage of vessels paying rates, inwards or outwards, during the twelve months ended on that date were 17,074 of 18,758,839 net register tons, a decrease of 2,289 ships and 321,889 tons, as compared with the year ended July 1st, 1932. The total of rates and dues was £2,314,142, a decrease of £119,480. The approximate total net tonnage of ships inwards and outwards was 37,517,678 tons, a decrease of 643,778 tons, and the weight of goods discharged and loaded approximately 12,300,000, a decrease of 900,000 tons.

The following figures show how these totals are made up, the figures for 1932 being given in parentheses:—

Paying dock tonnage rates were 3,502 vessels of 11,794,434 net register tons, foreign (3,591 of 11,881,054 tons) and 8,135 vessels of 2,382,909 tons, coastwise (9,464 of 2,605,249 tons), the total tonnage being thus 14,177,343 tons (14,486,303 tons).

Paying harbour rates only were 1,487 vessels of 3,307,272 tons, foreign (1,600 of 3,177,441 tons) and 3,950 vessels of 1,274,224 tons, coastwise (4,708 of 1,416,984 tons), the total tonnage being 4,581,496 tons (4,594,425 tons).

Adding the vessels paying dock tonnage rates and harbour rates only, the grand total is 17,074 ships of 18,758,839 tons (19,363 of 19,080,728 tons). To arrive at the total tonnage which entered and left the Mersey it is necessary to double the figures. The approximate total inwards and outwards for the year just ended would therefore be 37,517,678 tons (38,161,456 tons).

With regard to rates received on vessels dock tonnage rates were £1,221,573 foreign (£1,253,822); and £75,490 coastwise (£81,522); harbour rates only were £46,689 foreign (£45,079) and £6,733 coastwise (£7,286). Including receipts on conservancy account of £237,202 (£237,382) the total tonnage and harbour rates were £1,350,486 (£1,387,709). Adding graving dock rates £29,869 (£37,861), and dock rent £23,777 (£23,555), the total rates on vessels were £1,404,132 (£1,449,125).

Rates and dues received on goods are dock rates and town dues. The former were £43,706 foreign inwards (£483,133), £74,547 foreign outwards (£71,807), and £59 coastwise inwards (£63) making a total of £506,312 (£555,003).

Town dues were £306,554 foreign inwards (£329,538), £79,079 foreign outwards (£76,373), and coastwise inwards £18,065 (£23,583), making a total of £403,698 (£429,494). Since April 1st, 1929, outwards coastwise town dues have not been charged on goods exported coastwise.

The total rates and dues on goods were therefore £910,010 (£984,497), and adding the rates on vessels, the grand total is reached of £2,314,142 (£2,433,622) which is inclusive of the receipts on conservancy account.

Vehicles in Port Areas.

Liverpool interests are frankly disturbed by the refusal of the Ministry of Transport to grant relief to motor vehicles employed in dock areas and are continuing to exert pressure on the authorities. Mr. R. V. Edwards, chairman of the Transport Committee of the Chamber of Commerce, has written to the Minister pointing out that the increased taxation of such vehicles will place the importers at Liverpool at a distinct disadvantage when compared with other ports, such as London and Hull.

"In Liverpool the whole of the sugar import has to be moved from ship to warehouse by heavy mechanical transport vehicles (owned by the sugar-importing firms) which never leave the precincts of the dock area, whereas in London the bulk of this commodity is moved by lighters. Hence the London importer will be at a distinct advantage over the Liverpool section of the trade.

"Again, in connection with the importation of oilseeds and cattle foods, whereas in Hull the bulk of these commodities are either moved by water or are rail-borne, the whole of the imports here have to be moved by heavy mechanically-propelled vehicles owned by the importing companies, or by vehicles which they hire for that purpose.

"In Liverpool the actual amount spent on the maintenance of roads in the port area has averaged less than £3,000 per annum, and firms whose vehicles use these roads have already contributed heavily to this cost through their local rates, in addition to the contribution made to the Road Fund of approximately £20,000.

"While the recommendation of the Salter Committee for the increased taxation of motor and heavy mechanical transport vehicles was put forward with a view to placing road transport and railway transport on a more equitable basis, the vehicles referred to do not in any way compete with the railway companies for traffic. On the other hand, they act as feeders to the railway companies. They provide a service by which the import and export traffic of the port is speedily handled, and one which the railway facilities of the port could not cope with.

"In view of the fact that Parliament failed to give consideration to the claims for these vehicles, there is evidence already before the committee that these vehicles will be replaced by horse-drawn vehicles, which will result in loss of revenue to the Road Fund and will, in more normal times, be a serious menace to the economic and expeditious working of the port."

£850,000 Foreshore Improvement.

Wallasey Corporation Works Committee has under consideration the idea of proceeding with the next stage of the £850,000 scheme for the extension of the promenade after the completion next year on the New Brighton promenade extension to the Red Noses.

The Borough Engineer and the Borough Treasurer are preparing reports on the matter. In favour of proceeding with the completion of the full scheme is the fact that the contractors' plant is already on the spot, that the workmen are available, and that the cost of labour and material is not likely to be lower in the near future. Furthermore, the foreshore land which is to be reclaimed by the continuation of the sea defence wall will be a valuable asset for the Corporation, as it is proposed to sell it for development purposes. The cost of the scheme now being completed, and upon which upwards of 200 men are being constantly employed, is in the neighbourhood of £450,000, and the probable cost of the further extension to Harrison Drive is put at £400,000.

Notes from the North—continued

Weaver Navigation Trust.

Members of the Weaver Navigation Trust made their annual survey a few days ago of the new bridge which the Trust and the County Council, with the help of the Ministry of Transport, are erecting over the Weaver at Acton Bridge. The widening of the road and the construction of the bridge at Acton became necessary owing to the great increase in road transport between Lancashire and Shropshire and Staffordshire. The bridge has a span of 240-ft., and is being erected by Messrs. Joseph Park and Son, at a cost of £5,000.

Adjustment of Dock Scales.

Mr. F. J. Bundy, chief inspector of weights and measures to the Liverpool Corporation, in his annual report mentions that 912 weighing instruments on the Mersey Dock Estate were examined during the past year—657 for the Dock Board and 255 for private firms—revealing that 108 required re-adjustment. Sixty of these were owned by the Dock Board. As regards weights the number examined on the Dock Estate was 9,872, of which 8,670 belonged to the Dock Board and 1,802 to private firms. It was revealed that 2,435 submitted by the Board and 367 by private firms required re-adjustment. Verification fees received in respect of weighing instruments and weights used on the Dock Estate amounted to £275.

Mersey Tunnel.

To the last meeting of the Mersey Tunnel Joint Committee, it was reported by Mr. B. H. M. Hewett, resident engineer, that the fixing of the dado in the tunnel had been nearly completed, over 7,390-ft. having been completed in the full-sized tunnels on the Birkenhead side. As regards the under-the-river work, 8,300-ft. of dado had been fixed, or 80 per cent. It is expected that the tunnel will be ready for opening about the middle of next year.

Isle of Man Pier Extension.

Isle of Man Tynwald has voted a sum not to exceed £50,000 for the continuation of the work on the Red Pier extension scheme.

Mr. R. C. Cain told the Tynwald that the work was proceeding satisfactorily, and was about half finished. Considerably over a thousand 15-ton blocks had been placed in position. The contract for the dredging had been broken, because of the complaints received from proprietors of hotels and boarding houses, not all in the immediate vicinity, as to the noise during the night. But for that, it would have been finished some time ago. The dredging company lost about 10 to 12 hours work per day, and that was the reason for the work taking so long, but it should be finished by August.

Mr. E. S. Inman, former Manager of the Weaver Navigation

Mr. Ernest Stobart Inman, for many years manager of the River Weaver Navigation Trustees at Northwich, died on July 9th at the age of 81 years.

On the death of his father in 1881, he became general manager of the Inman Steamship Co., of Liverpool, relinquishing that position on the transfer of the fleet to the International Navigation Co., in October, 1886. He was chairman of the Liverpool Steamship Owners' Association in 1881. In April, 1892, he was appointed general manager of the River Weaver Navigation and came to reside at Davenham where he remained until his retirement from business in September, 1919. He was a Commissioner of the Upper Mersey Navigation for more than 30 years, and was appointed a Justice of the Peace for the County of Chester in 1907.

Preston Dock Returns.

Mr. J. G. Merriweather, of the Ribble Navigation, reports that the number of vessels entering the Preston port down the River Ribble during 1932-33 was 1,401, the total net registered tonnage aggregating 549,788.

Two hundred and thirty-four vessels came from foreign ports, their registered tonnage being 349,593. There was an improvement of 77 tons per vessel in net registered tonnage compared with the previous year. Thirty-six tankers landed 101,260 tons of oil and petrol. There has been handled during the year the largest drafted vessel which has yet entered the port, the tanker "Duivendrecht," which discharged 5,817 tons of petrol, this being the largest single cargo discharged at the port at one time. There has been a decrease in imports, amounting to 39,590 tons, but some traffics increased, such as wood pulp, 3,023 tons, grain 3,204 tons, slates 7,625 tons, and bitumen 7,868 tons. The principal declines were in timber 12,043 tons, china clay 2,250 tons, motor spirit 6,013 tons, road stone 27,103 tons and cement 2,994 tons.

The exports total was 186,911 tons, which gives a decrease of 35,301 tons on last year.

The total imports and exports were 843,787 tons, or a decrease of 74,891 tons.

The income for the year amounted to £204,150, compared with the previous year's £221,302, a decrease of £17,146. The expenditure was £141,705, against £162,132, a decrease of £20,427.

The net deficiency after meeting interest charges was £24,866 compared with £28,598 for the previous year.

Graving Dock Dues.

Consideration has been given by the Transport Committee of the Liverpool Chamber of Commerce to the dues on vessels using Liverpool Graving Docks, following a complaint received from members with regard to tonnage dues charged in Liverpool. The Mersey Docks and Harbour Board was asked to reconsider the dues imposed on vessels desirous of having repairs executed in the Port of Liverpool.

The Mersey Docks and Harbour Board replied that no further reduction in the rates made on vessels entering the port for the sole purpose of using the graving docks could be recommended, and that the estimate of dues referred to by the correspondent who raised the matter, had been calculated on a wrong basis.

Dock Bridge Mishap.

Owing to the failure of the Mersey Docks and Harbour bridge at Duke Street, connecting Birkenhead with Wallasey, there was considerable dislocation of traffic recently. A queue of vehicles waiting to cross the dock estate stretched a half-mile on either side of the bridge. The bridge, which is normally operated by hydraulic power in 30 seconds, had to be raised and lowered by hand, due, it is stated, to damage done to the plant by excavation work carried on near by. The bridge, which is owned by the Mersey Docks and Harbour Board, was erected last year at a heavy cost. It superseded a century-old bridge which revolved when liners and boats proceeded to and from the West Float.

The Port of Amsterdam

The position of the Port of Amsterdam can be seen from the following figures in regard to number of vessels and tonnage and to the goods traffic arrived and sailed, as compared with the corresponding figures of last year.

SEAGOING VESSELS AND TONNAGE

		ARRIVALS				SAILINGS			
		No.	Per Cent.	N.R.T.	Per Cent.	No.	Per Cent.	N.R.T.	Per Cent.
June	1932	291		406,065		293		416,224	
,,	1933	287		392,119		274		380,087	
		—4	—1·37	—13,946	—3·43	—19	—6·48	—36,137	—8·68
May	1933	265		367,416		275		381,867	
June	1933	287		392,119		274		380,087	
		+22	+8·30	+24,703	+6·72	—1	—0·36	—1,780	—0·47
Jan.-June	1932	1,657		2,429,631		1,656		2,438,612	
,,	1933	1,589		2,253,690		1,588		2,283,610	
		—68	—4·10	—175,941	—7·24	—68	—4·11	—155,002	—6·36

SEAGOING GOODS TRAFFIC
(In Tons of 1000 Kilos*).

			1 Import	2 Transit incl. in col. 1	Export	4 Transit incl. in col. 3	5 Total col. 1 & 3
May	1932	...	291,278	45,265	105,481	34,167	396,759
,,	1933	...	289,611	49,419	115,183	44,249	404,794
			—1,667	+4,154	+9,702	+10,082	+8,035
			—0·57%	+9·18%	+9·20%	+29·50%	+2·03%
April	1933	...	229,365	53,850	116,424	39,303	345,789
May	1933	...	289,611	49,419	115,183	44,249	404,794
			+60,246	—4,431	—1,241	+4,946	+59,005
			+26·27%	—8·23%	—1·07%	+12·58%	+17·06%
Jan./May	1932	...	1,479,800	257,263	638,113	165,060	2,117,913
,,	1933	...	1,403,752	284,623	632,572	224,484	2,036,324
			—76,048	+27,360	—5,541	+59,424	—81,589
			—5·14%	+10·64%	—0·87%	+36%	—3·85%

*These figures have been taken from the monthly statistics of the Central Bureau, The Hague, Holland.

Classified according to flag the number of vessels which entered the Port of Amsterdam during June, 1933, was: Dutch, 125; Great Britain, 48; German, 47; Swedish, 19; Norwegian, 18; Danish, 6; French, 2; Greek, 2; Lettish, 6; Finnish, 6; Italian, 1; Estonian, 2; Belgian, 2; Russian, 1; Portuguese, 1; Czecho Slovakia, 1.

Vessels laid up at Amsterdam: 1st June, 1933, 36 vessels, measuring 194,665 tons gross; 1st July, 1932, 64 vessels, measuring 321,307 tons gross; 1st July, 1933, 30 vessels, measuring 145,621 tons gross.

Bromborough Dock M

By P. COURTNEY rcial

Panorama of Bromborough Dock a

SINCE its opening two years ago, Bromborough Dock, which is owned by Lever Brothers, Ltd., has established itself as an important terminal for ocean-going steamers bringing cargoes of raw materials required at the extensive works of Lever Brothers and their associated companies. The constructional features of this dock were fully described in the issue of *The Dock and Harbour Authority* of May, 1931, but since then considerable progress has been made in completing the equipment of the dock in order to facilitate efficient discharge and loading of cargoes and towards the speedy " turn round " of vessels. Up to the end of June, 1933, over 600 vessels have entered and cleared Bromborough Dock, the total cargoes dealt with approaching the 500,000-ton mark.

Actual shipping and cargo returns to June 30th are :--

	Vessels	N.R.T.	Cargo Tonnage
Foreign	266	506,199	415,458
Coastwise	392	147,805	83,745
	658	654,004	499,203

As with all docks, installation of appropriate lay-out and equipment called for close study, as whilst it was intended the dock should be modern in all respects to cope efficiently with miscellaneous cargoes, there were certain cargoes which necessitated special appliances. It is satisfactory to record that in the short period the dock has been in operation it has been found possible to instal storage, transport and cargo-handling lay-out and appliances appropriate to the cargo handled, and at the same time as advanced as anything seen at other ports.

Having a deep water area of 18 acres the surrounding quays provide some 2,900 linear feet of berthage for vessels and 84,000 sq. yds. of adjoining quay space. The entrance lock is 75-ft. wide and 165-ft. long, allowing barges and river craft to enter and leave the dock at all times above the level of half-tide. The depth of water over the sill at high water varies from 35-ft. on spring tides to 25-ft. on neap tides. The dock, with its quays, occupies a total area of 37 acres, and is flanked on the north and south sides by reclamation areas of approximately 100 acres. Those areas immediately surrounding the dock were filled in with excavated material from the dock site. Nowhere is there semblance of temporary expedients. In the immediate vicinity of the dock, an extensive estate of over 600 acres is available for industrial developments.

Railway communication is provided by means of double tracks connecting the dock with the main Birkenhead-London Line of the L.M.S. and G.W. Joint Railway Co.'s lines. The new railways enter the dock estate through a specially constructed cutting which forms part of the dock works. Adequate provision has also been made for road traffic, two wide roadways having been constructed from the main Birkenhead-Chester road. These give direct access to the north and south quays of the dock, and enable goods carried by road vehicles to be received and despatched without any irksome delays due to congestion of traffic. The main arterial road from Birkenhead to Chester and the South forms the western boundary of the Dock estate, and it is from this roadway that one of the entrances to the new Mersey tunnel is being constructed, so affording direct communication by road between the dock and Liverpool and the Northern and Midland counties. Thus it will be appreciated that in the matter of transport Bromborough Dock is located in a " key " position. It is a terminal, and yet a centre, within a radius of 50 miles of which are embraced important industrial areas.

Three transit sheds, two 360-ft. by 75-ft. on the South Quay and one 300-ft. by 60-ft. on the West Quay, are provided, each of them having Customs lock-ups measuring 75-ft. by 32-ft. and taking in the entire height of the shed. These sheds were erected by William Bain and Co., Ltd.

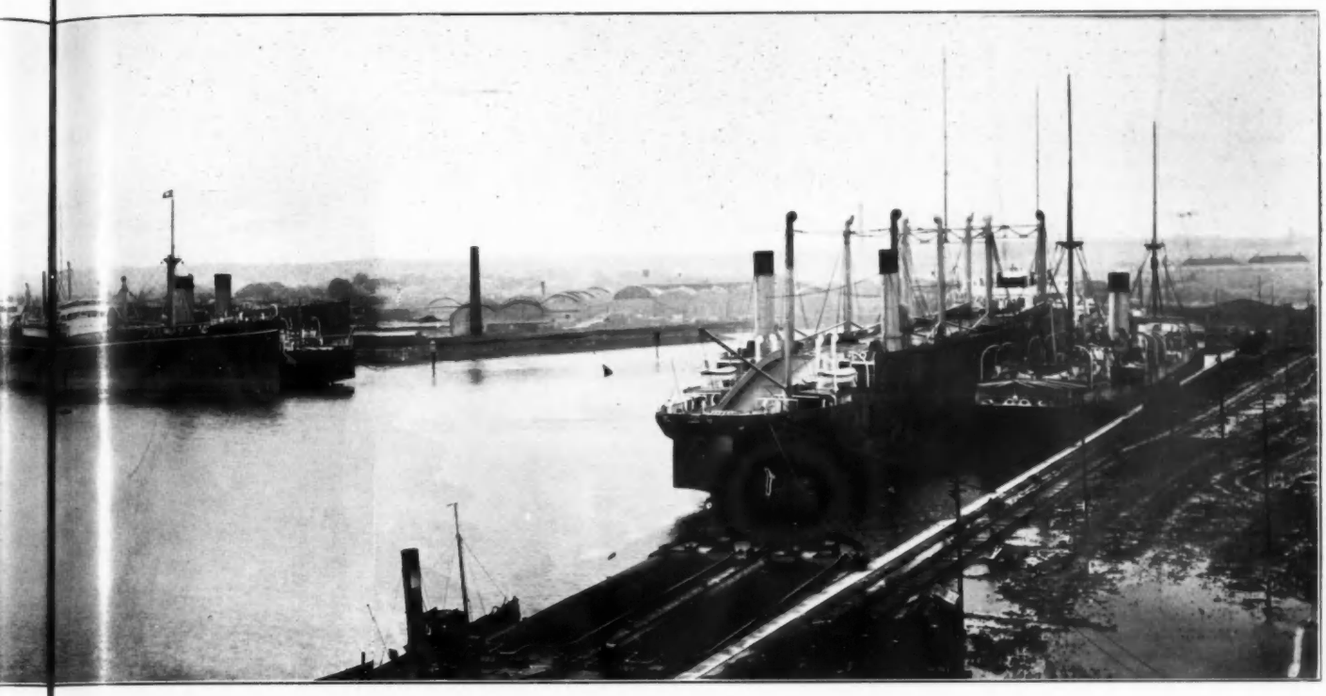
Run-about shed cranes supplied by James Tate and Co., of Bradford, and electric quay cranes supplied by Babcock and Wilcox are installed to facilitate the handling of cargoes. There are in all five quayside cranes, and these are used regularly to deal with palm kernel seed and general cargo between vessels and quays, and, being portable, can serve the East, South and West quays of the dock. They are of sturdy construction and designed for heavy service and continuous working. They are also used for coaling vessels from railway wagons and unloading palm kernel seeds and other cargoes from vessels to barges.

These massive cranes, each of which has a travelling speed on full load of 60-ft. per minute, tower some 60-ft. above the quay level, have a reach of 55-ft., a hoisting speed of 100-ft. per minute (five-ton load) and a slewing speed on full load of maximum radius of 600-ft per minute. Other particulars are: Luffing speed on full load measured horizontally, 225-ft. per minute; maximum radius, 70-ft.; height above low water level to highest position of hook at maximum radius, 78-ft.

The motors are operated by means of reversing type controllers suitable for intermittent work, controls being fitted in driver's cabin. All controls are electrically interlocked with crane protective panels, and hoisting and luffing controls have contacts for use with limit switches. An overwinding is fitted in conjunction with magnetic brake in case the driver inadvertently overwinds the hook. The device is of self-resetting type and suitable for adjustments. With 2-ton loads the cranes will hoist at 300-ft. a minute and with five tons at 150-ft. a minute. Not only are these 2/5-ton high speed electric cranes suitable for the usual handling cargo operations between ship and shore, but each crane is fitted with four rope-type grabs which enable

Dock Modern Equipment

RTNEY cial Dock Manager



gh Dock a Whaling Factory alongside.

loose bulk cargoes to be handled expeditiously. Each crane is fitted with four electric motors for travelling, hoisting, luffing and slewing, so that each movement can be obtained separately or all four simultaneously, so effecting time saving in operation. Between South and East quays a crane turntable, supplied by Babcock and Wilcox, has been installed.

One of the most striking features of the dock equipment is what may be described as the Tank Park, where provision has been made for the storage of 28,300 tons of bulk oil.

The oil tank storage installation comprises:—

No. of Tanks	Height	Diameter	Capacity in tons	Total Capacity in tons
10	32-ft.	60-ft.	2 000	20,000
5	32-ft.	43-ft.	1,000	5,000
6	32-ft.	31-ft.	500	3,000
1	32-ft.	22-ft.	300	300
22				28,300

The tanks were all supplied and erected by Jenkins Bros. (Birkenhead), Ltd. Efficient heating to meet severe winter conditions is provided, and for this purpose solid drawn mild steel heating coils are installed inside the tanks. These coils are electrically welded to minimise possibility of leakage.

The boiler house plant consists of two Babcock and Wilcox water tube boilers operating on oil fuel, and steam is available at a pressure and in quantities sufficient for heating oils and to scour out and clean thoroughly the entire receiving and distributing plant after use.

The weighing and distribution stations are interesting units of the Tank Park equipment. The weighing house is equipped with four Avery 30-ton weighing machines, two Mather and Platt pumps, each of a capacity of 120 tons an hour, and four G. and J. Weir pumps of the following capacities: two of 200 tons per hour, one of 150 tons per hour and one of 40 tons per hour.

These pumps, which are electrically operated, can, if necessary, be utilised to assist or " boost " the discharge of oil from ship's pumps, or to act as " transfer " pumps.

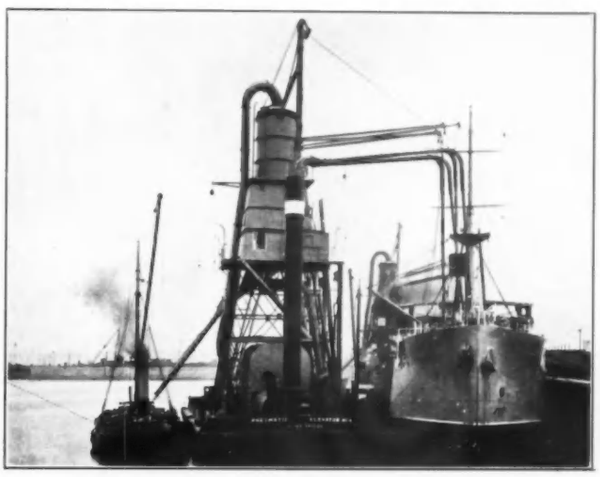
The weighing machines are used in pairs and are so arranged that continuous pumping takes place. On a fully equipped vessel with freely pumpable oil, discharge could be maintained at some 600 tons per hour direct into the storage tanks. When weight checking has to be performed and the weighing machines utilised, discharge at the rate of 200 tons per hour could be maintained.

Should the vessel not be equipped with oil pumps, electrically operated portable pumps, supplied by Mather and Platt and specially designed to suit restricted hatch openings, are available, each with a capacity of 150 tons an hour.

The distribution of the oil from the storage tanks has been specially studied, and the plant is so designed that oil can be drawn from any tank and pumped or gravitated into coasting steamer, barge or rail tank wagon, with or without weighing, at rates varying from 60 to 300 tons an hour, depending upon requirements. Thirty 10-ton wagons can be filled, weighed and passed out in an hour.

Good use has been made of the facilities provided in the dock for the loading of ships' bunker coal supplies, and a number of vessels have also received oil fuel supplies which were delivered by Shell-Mex tank lighters.

The channel approach to the dock has been maintained by Messrs. Bos and Kalis' plant, consisting of a bucket dredger, two dumb barges, suction pump-ashore plant and a small tug steamer. The silt is removed from the river bed by the bucket dredger and delivered into dumb barge alongside. The tug steamer then tows the barge to the pump-ashore unit, which discharges the dredged material by suction pumps and by means of pipe line deposits same in the reclamation area. Work, as already mentioned, is in progress in filling in the southern reclamation area, which is enclosed by a specially constructed river wall measuring some 3,435 lineal feet, with a return wall 360-ft. long at the southern limit, and already a large tract of land is available for any scheme of dock development. The north reclamation area is enclosed by a river embankment



Bromborough Dock. Pneumatic Elevator at work.

Bromborough Dock's Modern Equipment—continued

3,000-ft. in length, returning at its northern end to the old river bank. The embankment is formed of sandstone rock and pitched on its river face.

Vessels owned by the following Lines have been dealt with in the dock: Blue Funnel Line (Alfred Holt and Co.), Nippon Yuson Kaisha Line, Furness Withy Line, United Africa Co., Ltd., American Steamship Lines, Olsen Line, Rotterdam Lloyd Line, British and Continental Steamship Co., Leith, Hull and Hamburg Steam Packet Co.; Ellerman Wilson Line, Holland Steamship Line and Hamburg Amerika Line.

Progress has been made with the inauguration of regular coastwise services between Bromborough and most United Kingdom ports. Amongst the weekly sailings are:—Bristol, Cardiff, Llanelly and Swansea (when inducement offers) on Monday; Falmouth, Glasgow, Penryn *via* Falmouth, Truro *via* Falmouth on Tuesday; Aberdeen, Dundee, Inverness, Leith, Newcastle on Wednesday; Southampton on Thursday. There are two sailings each week, on Tuesday and Thursday, to London and Plymouth, also *via* London to Boston (Lincs.), Ipswich, King's Lynn. In addition there is a fortnightly sailing every alternate Saturday to Belfast, and every ten days to Dover, Poole, Portsmouth, Shoreham, Isle of Wight *via* Portsmouth. An opportunity for shipping to Channel Islands presents itself on three days each week—Monday *via* Bristol, Tuesday *via* Plymouth and/or London; Thursday *via* Southampton.

Many interesting types of cargoes have been discharged in the dock, amongst which are the large shipments of whale oil brought from the large floating whaling factories operating in the far off Antartic. These vessels are owned by the Southern Whaling and Sealing Co., and although this perhaps is not the place to describe such interesting craft as whaling factories (so called for the reason that they not only collect the catches from the whale catchers, but treat them aboard), the photographs will give some idea of the size of these factory ships which are regularly accommodated in Bromborough Dock.

Representative whale oil vessels which have been accommodated and discharged in the dock are:—

Vessel	N.R.T.	Length	Beam
Thorshammer ...	7,326	566·0	66·5
Thorshavn	4,044	435·0	57·2
Thorsholm	4,046	448·5	57·2
Hilda Knudsen ...	5,482	470·3	64·5
Kaia Knudsen ...	5,533	471·1	64·4
Anna Knudsen ...	5,389	471·1	64·4
Southern Empress ...	7,599	525·5	66·5
Southern Princess ...	7,578	530·0	66·6

Whilst no " records " are claimed, it may be of interest to mention the speed at which the cargoes of whale oil imported by these vessels were discharged to shore storage tanks:—

Vessel	Average speed of discharge Tons per hour
Thorshammer	163
Thorshavn	128
Thorsholm	202
Hilda Knudsen	195
Kaia Knudsen	217
Anna Knudsen	224
Southern Empress	234
Southern Princess	223

As well as the huge supplies of whale oil from the South Polar regions, substantial cargoes of commodities from all parts of the world have come to Bromborough. These embrace sardine oil from Japan, resin and tallow from North America, copra from

Bromborough Dock's Modern Equipment—continued

Bromborough Dock, showing Railway Sidings and Dock Sheds.

the Straits Settlements, palm kernels and palm oil from West Africa. Large consignments of timber from Scandinavia have also been handled.

So much for a brief outline of the progress made at Bromborough Dock since it was opened some two years ago, and no one can foretell what the Dock Estate will look like when its development is complete.

Meantime it may be appropriate to record that traffic returns show a steady and continuous increase, and this in itself is proof that the dock has justified the vision that led the late Lord Leverhulme to embark upon this great enterprise.

Even in the short space of two years there has been a transformation, and most probably in another two years one will see changes no less marked. In this connection, work has just been commenced on the construction of modern dockside silos, which will provide storage accommodation for 10,000 tons of kernels and kindred bulk seed imports. When completed, these storage facilities will permit of rapid direct discharge from ship to silo. A further advantage will be that factories and oil mills in the vicinity will obtain their supplies by the more economical medium of rail transport as compared with present method of barging.

Irish Harbour Matters

Cork

Meeting of Cork Harbour Board.

At a meeting of the Cork Harbour Board, Mr. R. Wallace (chairman) presiding, the recommendation of the Pilotage Committee that the vessel "Drudger," engaged in removing the wreck of the liner "Celtio," be not exempt from the payment of pilotage dues, was considered.

Mr. Horgan said that the intention of the original committee was to exempt whatever firm got the contract from all charges. It would be equitable to do so whatever the strict construction of the agreement with the firm might be. The Board was entitled to grant this exemption, and he thought they should take a big view of the matter, especially as he understood that the work was going on satisfactorily.

Mr. Doyle said that they had an honourable agreement with the owners of the vessel and they should stand over it.

Captain Collins pointed out that the pilots would be deprived of monies to which they had a right. He was, however, prepared to abide by the decision of the Board.

Mr. Magennis said that the law agent had told them he contemplated the exemption from harbour charges, including pilotage charges. He strongly supported exemption.

Mr. Horgan then moved that the Committee's recommendation be deleted, and that the exemption be granted in accordance with the Board's agreement with the owners.

Mr. Crowley seconded, and this was unanimously agreed to.

Daunt's Rock.

The Irish Lights, replying to a request of the Board to extend the radius of the Daunt's Rock radio beacon, stated that they were not prepared to extend the beacon's operations when visibility was less than ten miles. An exception could not be made in the case of this particular beacon. They would consent to the request that it be operated when requests were made by incoming liners to the pilot boat for the signal. It was their intention to replace the present lightship next September, when it was intended to transmit the wireless signals twice every half-hour in clear weather and the usual fog signals in fog.

The general manager said he would acknowledge the letter and would again put up the request to have the beacon's radius extended.

The Institute of Transport Congress, 1934.

The Council of the Institute of Transport has decided that the next Congress of the Institute shall be held from June 6th to June 9th, 1934, and has provisionally agreed upon Leeds as the venue.

Immingham Dock Statistics.

During the month of June a total of 102 vessels, representing a net registered tonnage of 148,930, used Immingham Dock, including 21 vessels totalling 35,300 net registered tons using the Western Jetty coaling berth, and one vessel of 12,009 n.r.t. engaged on a passenger cruise, as compared with June, 1932, when 119 vessels totalling 182,137 net registered tons used the port, including 29 vessels totalling 39,693 net registered tons using the Western Jetty, and two vessels of 24,018 n.r.t. engaged on passenger cruises.

Hull and the Humber

The Humber Bridge Bill.

IT is not beyond the bounds of probability that an effort will be made to revive the Humber Bridge Bill in the next session of Parliament. The scheme prepared by Sir Douglas Fox and Partners is already in existence and provides for the construction of a road bridge over the River Humber between Hull and North Lincolnshire at a reduced cost of £1,500,000, made possible by economies which the authors have been able to effect. The hopes of revival have been greatly encouraged by an announcement by the Minister of Transport that he is prepared to examine schemes for the construction of self-supporting toll bridges, with a view, presumably, to affording financial aid. The projected Humber bridge comes within the scope of this definition. Evidence was given by Sir George Maybury and others when the Bill was before Parliament a few months ago that the estimated revenue from traffic using the bridge would be sufficient to cover expenditure, including the interest on debentures which it was proposed to issue to finance the scheme.

In the first instance the Government promised to contribute 75 per cent. of the estimated cost of the bridge, but owing to the state of the national exchequer when the present Government assumed office, this was withdrawn. A State grant would obviously simplify matters for the promoters, and it is contended would facilitate the accomplishment of a practicable and necessary project and be a means of providing work in the steel industry and for unemployed unskilled labour. A considerable amount of research and preliminary work has been done, and a large sum of money spent in promoting the Bill, which only failed to reach its Third Reading on a technical point of procedure connected with the material change in the financial provisions of the measure as it was deposited. The matter is now under consideration by a Committee of the Hull Corporation, the sponsors of the project, and developments are being closely watched by shipping interests at Hull and Goole and the Humber Conservancy Commissioners, who are strongly opposed to the scheme on the ground of possible grave danger to shipping and the channels of the river.

Filling-in the Old Queen's Dock at Hull Proceeding Rapidly

The filling-in of the old Queen's Dock at Hull is proceeding rapidly, and the water area of ten acres has now completely disappeared. Hundreds of thousands of tons of material have been deposited to the extent of about three-quarters of the quantity ultimately required. On the former quays new streets have been constructed, and at certain points roads have been made across the dock from north to south and thrown open to traffic. Near the east end, pile drivers are at work making a foundation for the Wilberforce column and statue, which are shortly to be removed from the Whitefriargate lockpit to the new site within a stone throw of the house in which the great emancipator was born. The entire area of the Queen's Dock estate—water, quays, warehouses, etc.—covers 22 acres, and the plans provide for this being converted into a boulevard with gardens and flanked on the north and south sides by municipal offices, technical college and business premises. Of most concern to the commercial community is the loss of the dock space, which formerly gave berthage to the smaller vessels engaged in the near Continental and coastwise trades, and afforded room for the fitting out of steam fishing trawlers. Efforts have been made to persuade the directors of the London and North-Eastern Railway, the owners of the docks at Hull, to put in hand without further delay the construction of an additional "arm" provided for in the original plans of the King George Dock. This would add nearly 30 acres to the water area of the port, together with quays, sidings, etc., all of which, and another grain silo, are considered by the shipping and trading interests to be urgently required to meet the expanding overseas trade of the port. The question of finance, however, stands in the way at present. In the meantime, however, the railway owners have spent a large sum of money on improved appliances at the existing docks, timber sidings and, more particularly, on the St. Andrew's Dock, where a new Billingsgate has been built at a cost of £100,000 and the old fish stage and offices modernised.

Improvement of River Humber Channels Proving Costly.

The improvement of the navigable channels of the River Humber by the construction of training walls at the confluence of the Ouse and Trent is proving a very costly affair, for though the authorised work is only a little more than done, the estimated cost has already been exceeded. In these circumstances the Aire and Calder Navigation have approached the Humber Conservancy Commissioners with a view to that body supplementing their original contribution of £76,000 towards the cost by a further sum of £76,000, or half the additional expenditure involved, which ever is the smaller. The estimate was 2½ times the engineers' pre-war estimate. In a letter to the Humber Conservancy Board, Mr. S. Bradbury, secretary of the Aire and Calder Navigation, states that owing to the unforeseen difficulties encountered in carrying out the work, the Navigation recently requested their consulting engineers, Messrs. Coode, Wilson, Mitchell and Vaughan-Lee (who have had extensive experience in river works) to advise on the quickest and most economical way of completing the work. The revised estimate for completing the Trent Falls Works within the Board's jurisdiction amounts to £189,000, including the amount already spent as against the Parliamentary estimate of £76,000, leaving a balance to provide of £113,000. The Navigation have recently exercised their borrowing powers to the full extent, viz., £490,000, and the amount raised, after paying off bank loans, is insufficient to complete the capital works in progress at Goole and the training walls in the Humber and Trent. There is no provision for any probable excess over the present estimates for these works, or to provide further necessary capital works on the undertaking of the Aire and Calder Navigation, so that additional money, Mr. Bradbury points out, would have to be found, for which the Navigation at present have neither the cash nor the borrowing powers.

The time limit for the completion of the works is July 15, 1934, and although the Navigation have continued the works with all diligence, it will not be possible to complete them by that date. It will therefore be necessary if the Navigation are to complete the wall to the full height (viz., 12-ft. above low water) for application to be made in the next session of Parliament for an extension of time. Apart from the training walls built in conjunction with the Humber Conservancy, the Aire and Calder Navigation have spent £40,000 from their own funds on the extension and completion of the Ousefleet training wall to join the other works. It is conceded that the walls, so far as they have been constructed, have considerably improved the channels of the Trent and Upper Humber, and it is hoped that the Conservancy, in recognising the beneficial effect they will, on completion, have upon the waters in their jurisdiction, will see their way to come to the financial aid of the Navigation in the manner indicated. The matter has been under consideration of the Works Committee of the Humber Conservancy, who have recommended that the whole subject be referred to a special committee of the Board. This course has been approved and a special committee appointed consisting of Mr. J. H. Fisher (Chairman of the Board), Mr. Bentley Bennett (Chairman, Finance Committee), Sir Hickman Bacon, Mr. Craggs, Mr. E. P. Hutchinson, Sir G. Moody, Capt. Morris, Mr. E. V. Taylor and Mr. H. V. Wright.

Hull Dock Returns show a Decline for the Half-year.

The reduced activity at the Hull Docks is shown by the official returns of imports, etc., compiled by the Hull Chamber of Commerce and Shipping for the June half-year. While the arrivals of wheat and kindred cereals aggregate 717,550 tons, or 176,000 tons more than in the same period last year, there is a reduction in oil seeds, nuts and kernels of 77,500 tons; in timber, 60,000 loads; and to a varying extent in petroleum, wool, fruit and vegetables, etc. On the export side there is a definite shrinkage in general merchandise and a falling off in the shipments of coal. The past quarter's exports of coal to places abroad were 765,145 tons, bringing the total for the half-year up to 1,567,683 tons, or 111,000 tons less than in the corresponding six months of last year. Compared with 1930, before the Coal Mines Act began to operate, there is a decline of no less than 1,275,000 tons on the half-year.

Dock Board Capital.

Mersey Docks and Harbour Board recently made a successful issue of £500,000 3½ per cent. debenture stock.

Mr. H. L. Roxburgh, chairman of the Finance Committee at a Board meeting, said the stock was created to be offered to holders of bonds falling due on July 1st, 1933, September 27th, 1933, and January 1st, 1934, in exchange for their bonds. The total amount of stock agreed to be issued aggregated £770,000, and it was, therefore, necessary for the Board, in order to complete the transaction, to create a further amount of stock. The Finance Committee recommended that £300,000 be so created. Of this, approximately £270,000 would complete the conversion referred to. It was proposed that the remaining balance should be issued to any applicants who desired to take it up. There was no intention, at present, of making a further issue of the 3½ per cent. stock. The stock does not in any sense form a new capital issue, but was merely the exchange of short-date for long-date security.

Italian Harbour Affairs

THE maritime traffic at Italian ports during the month of June, 1933, included the arrival of 19,103 ships representing 7,131,238 n.r.t. carrying 1,867,018 tons of goods and 278,737 passengers, and the clearance of 18,941 ships, 7,106,954 n.r.t. with 711,465 tons of goods and 258,729 passengers. The total shipping at Italian ports has reached, therefore, during June, 38,044 ships arrived and cleared with 14,238,192 n.r.t., 2,578,483 tons of goods and 537,466 passengers. During the corresponding period of 1932 shipping at Italian ports included the arrival of 18,215 ships representing 6,456,365 n.r.t. carrying 1,905,269 tons of goods and 306,259 passengers, and the clearance of 18,068 ships representing 6,383,593 n.r.t. carrying 631,982 tons of goods and 323,069 passengers. Total shipping at Italian ports during June, 1932, included the arrival and clearance of 36,283 ships representing 12,839,958 n.r.t. carrying 2,537,251 tons of goods and 629,328 passengers.

It appears from the above-mentioned figures that shipping at Italian ports during the month of June has increased both in regard to tonnage arrived and cleared and to goods unloaded and shipped. There has been a decline, however, in connection with the passenger trade, the reason for which is due particularly to a depression in the coastwise trade, as the trans-Atlantic passenger trade has just recently shown an increase, especially on the North American and the Far Eastern routes.

Detailed statistics regarding the position of shipping at each particular port have not been published yet. The only available information in connection with the situation of shipping is at Genoa, where the total traffic from January 1st to May 31st, 1933, included 3,195,184 tons of goods unloaded and loaded, against 3,001,320 tons during the corresponding period of 1932, with an increase of 193,864 tons of goods. There has been a decrease in the imports of cereals from 449,659 tons on May 31st, 1932, to 262,959 tons on May 31st, 1933, owing to the increased Italian cereal crop. Goods shipped have shown an increase of 15,634 tons. During the first five months of 1933 the passenger traffic has shown an increase of 35.24 per cent. Shipping at Genoa has shown, during the first five months of 1933, an improvement of 7.98 per cent. in respect to the corresponding period of 1932.

The Chamber of Commerce and Industry at Trieste has published the returns regarding shipping at that port during the first six months of 1933, which are shown in the following schedule:—

		1933 Centals		1932 Centals
ARRIVALS—				
By Rail	..	2,317,748	...	2,618,985
,, Sea	...	6,813,493	...	8,516,833
	Total	9,131,241	...	11,135,818
CLEARANCES—				
By Rail	...	3,586,534	...	4,695,364
,, Sea	...	2,231,569	...	2,473,193
	Total	5,818,103	...	7,168,557
TOTAL TRAFFIC—				
By Rail	...	5,904,282	...	7,314,349
,, Sea	...	9,045,062	...	10,990,026
	Total	14,949,344	...	18,304,375

Trade in the Port of Trieste has shown a considerable loss as a whole, but if the details are examined it will be noticed that the greatest share of this decline is due to railway traffic, while shipping has shown improvement lately. The Italian Government is doing its best to assist trade in the Port of Trieste, as a contract has just been signed with the Trieste dockers for the unloading of 100,000 tons of coal to be imported on behalf of the Italian State Railways Administration. It may be interesting to add that the Standard Oil Company intends to enlarge the Trieste Oil Refinery, increasing the refining capacity of the plants from 60,000 to 150,000 tons yearly, and this should considerably increase the trade of the Port of Trieste. The Azienda dei Magazzini Generale is now studying the possibility of completing the Porto Duca d'Aosta east from the old Port of Trieste, and it is announced that important constructions are to be carried on there.

Lloyd's Register Shipbuilding Returns for the Quarter ended 30th June, 1933

THE statistics issued by Lloyd's Register of Shipping regarding merchant vessels under construction at the end of June last show that in Great Britain and Ireland there is an increase of 35,101 tons in the work in hand as compared with the low figures for the previous quarter, and also that the present total—287,502 tons—is 6,810 tons in excess of the tonnage which was being built at the end of June, 1932.

The figure for June, 1933, includes about 140,000 tons on which work has been suspended—134,000 tons of steamers and 6,000 tons of motor ships. The increase recorded above continues the upward tendency which, for the first time since March, 1930, was noted at the end of the first quarter of this year.

About 55,000 tons—19 per cent. of the tonnage now being built in this country—are intended for registration abroad or for sale.

The tonnage now under construction abroad—444,993 tons—is about 44,000 tons less than the work which was in hand at the end of March, 1933, and is the lowest recorded since December, 1909. Tonnage, included in this figure, on which work has been suspended amounts only to 1,560 tons of steamers and 24,253 tons of motor ships.

The four leading countries are:—France, 92,406 tons; Japan, 82,280 tons; Sweden, 78,232 tons; and Germany, 49,855 tons.

The total tonnage under construction in the world amounts to 732,495 tons, of which 39.2 per cent. is being built in Great Britain and Ireland, and 60.8 per cent. abroad. The total for the world at the end of June is 8,449 tons less than that for 31st March last, and is the lowest recorded for 40 years.

In Great Britain and Ireland, 50,050 tons were commenced during the last three months. While this figure is 27,256 tons less than the corresponding total for the March quarter, it has nevertheless only twice been exceeded since the fourth quarter of 1930. During the quarter ended June, 1933, 11,036 tons were launched in Great Britain and Ireland, showing a decrease of 1,906 tons as compared with the March quarter. Similar figures for abroad are 70,880 tons commenced, and 68,288 tons launched, showing an increase, as compared with the previous quarter, of 7,087 tons in the tonnage commenced, and a decrease of 11,503 tons in the tonnage launched.

The oil tankers under construction in the world amount to 22 vessels of 160,464 tons, of which 4 vessels of 30,026 tons are being built in Great Britain and Ireland, 7 vessels of 47,600 tons in Sweden, 2 of 24,800 tons in Germany, and 2 of 21,726 tons in Italy. It is noteworthy that motor ships account for nearly 90 per cent. of the total tanker tonnage under construction, which comprises nearly 22 per cent. of the total steam and motor tonnage being built in the world.

Of the 287,502 tons under construction in Great Britain and Ireland at the end of June, 81,118 tons consisted of motor ships, while at the same date the motor ship tonnage being constructed abroad (333,879 tons) was 223,500 tons in excess of that of the steamers.

The vessels being built in the world at the end of June include 1 steamer and 10 motor ships of between 8,000 and 10,000 tons each; 5 motor ships of between 10,000 and 20,000 tons; and 2 steamers and no motor ships of 20,000 tons and upwards.

The table respecting marine engines shows that the horse-power of steam engines now being built or being fitted on board amounts to about 460,000 h.p.; these figures include 16 sets of turbine engines of about 356,000 shaft horse-power. The horse-power of the steam reciprocating engines (about 104,000 h.p.) amounts to 11.7 per cent. of the total horse-power of marine engines now being built in the world. The figures for oil engines aggregate about 433,000 h.p.

Tonnage to Lloyd's Register Class.—Although influenced by the continued reduction in the amount of shipbuilding in hand throughout the world, the total of the tonnage being built under the inspection of Lloyd's Register at the end of June amounts to 507,069 tons, viz.: 254,957 tons under construction in Great Britain and Ireland, and 252,112 tons abroad.

Southampton Docks (continued from page 300)

rail tracks and vehicular roads. A space will be reserved for the construction of a cargo shed. It is considered that later on it may be desirable to carry out the ordinary traffic operations of loading and unloading cargo while a ship is in dry dock, and such a structure would make this possible. The equipment will also include mains for gas, oil, water, compressed air and electric current.

Construction.

The construction of the dock has been a matter of interest on account of the very rapid progress made. The decision to build it was made in January, 1931, at which time the site of the dock was a tidal mudland. The area was immediately surrounded by a gravel enclosing bank, made watertight by means of a curtain of inter-locking steel sheet piling driven along its centre line. Meanwhile, designs were made and a contract was let, and immediately the bank was finished in June, 1931, the site was pumped out and excavation commenced. A certain amount of excavation was carried out in the open, chiefly to remove a bed of gravel which covered the whole area, and which was used for making concrete. Below that level, timbered trenches were sunk for the construction of the walls, after which the dumpling between them was excavated so that the floor could be laid in. The concrete was all mixed at a central station at the north end of the dock, and there filled into bottom door boxes which were conveyed by wagon to wherever needed. The works were remarkably free from soakage water, and what there was was conveyed by means of drain pipes, to a low level pump at the south end of the dock which was built before any other excavation was commenced. The work involved 1,258,000 cubic yards of excavation and 456,000 cubic yards of concrete, and owing to the excellent way in which the job was planned and arranged, this work was all carried out between June, 1931, and April, 1933. In view of the complicated nature of the structure, this is probably a record achievement. The few weeks which remained before the dock was flooded were occupied in completing the dressing of the granite caisson stops and fixing the slide paths, and other items of equipment. The final operations are now completed, namely, the cutting through of the enclosing bank at the entrance, which has mostly been done by dredging, and the floating into position of the caisson, and the completion of the pumping installation and other equipment. (The graving dock was officially opened on Wednesday, July 26th, 1933. See Editorial Comments.)

Artesian Water.

It was discovered at an early date that a bed of sand, charged with artesian water at considerable pressure, existed below the site of the dock, and that the pressure was such that unless preventive measures were adopted, the water would undoubtedly burst up into the dock excavations. This was obviated by sinking five tube wells on each side of the dock, down to the sand, the tubes being perforated and surrounded by filters at the sand level. Into these wells, electrically-driven pumps were inserted, which lowered the pressure head by converting it into velocity head, and thus enabling the excavation to be carried out without interruption or damage. The work was carried out by Messrs. Siemens-Schuckert (Great Britain), Ltd., and under the advice of Dr. Sichardt, who has advised several such installations on the Continent. After the walls and floor were built, the pumps were withdrawn one by one, but the wells were not filled in but were connected by horizontal drains to the graving dock, and allowed to discharge at a level of 40-ft. below quay. This was done in order to give a certain degree of permanent relief to the water pressure, and thus obviate any earth movement occurring at any future time.

Approaches to Docks.

A skeleton scheme of vehicular roads has been devised, with approaches from the town at three main points. At the moment the only road approach open is the one near the Royal Pier, from which a vehicular road has been constructed along the back of the first pair of sheds.

Quays are to be well provided with rail sidings which connect to the group of marshalling sidings placed landward of the cargo sheds. These sidings will connect with the main line at two points, one at the western end of the estate close to Millbrook Station, which will be the principal gateway for passenger and goods trains to and from London and the Midlands. In anticipation of the increased traffic between Millbrook and Southampton West which this railway connection will involve, powers have been obtained to double the line throughout this length, and to provide four lines of way at Southampton West Station. This work may be said to have started in that a new overbridge is being built over the West Station which will replace the busy level crossing which exists there. The other connection, which is the only one working at present, is past the Royal Pier and Town Quay to the Terminus Station via the existing docks. Eventually this connection will be limited to local traffic. The latter connection has involved the reconstruction of the Toll House of the Royal Pier, and also of the quay wall between that pier and the Town Quay. The latter work was interesting in that it involved the use of reinforced concrete piles with special anchor ties connected to the piles by reinforced concrete pins and provided with anchors of the same material. The system was designed by M. Louis Ravier, of Paris, to provide anchor ties which should continue to function even after they had settled down in the loose ground by which they are surrounded. The whole of the work carried out in connection with this railway approach was also interesting from a town planning point of view. The main road between the Town Quay and the new dock gate has been considerably widened, and from it a good view is obtained of the new toll house, which is a striking piece of architectural design, and also of the 10 acres of land which have been reclaimed seawards of the road, and which will be laid out by the Southampton Corporation as a recreation ground.

Culverts.

The reclamation of the land at the eastern end of the dock estate has involved the provision of two 7-ft. diameter culverts in order to provide condensing water to the Corporation Electricity Station which, originally built on the foreshore, is now well inland. It has also involved the provision of a similar sized culvert for the discharge of storm water which discharged on to the original foreshore. These three culverts have for the most part been built in one trench, the storm water culvert being placed above the two condensing water culverts, the whole making a structure of a " shamrock " form. Each consists of 7-ft. diameter reinforced concrete linings, pre-cast in 6-ft. lengths, and surrounded by mass concrete. A system of valves at the electricity station enables the two condensing water culverts to be used as flow or return at will, and also the storm water culvert to be used as a return in case it is desired to dry out either of the other culverts. The storm water culvert connects with a special pumping station which has been erected at the eastern end of the quay wall, and which can be brought into use at times of exceptional high tide or of heavy flood, so as to obviate the danger of low-lying lands near the West Station becoming flooded. It is estimated that there is a possibility that about 220 cu. secs. might have to be dealt with at this station for a short time, and accordingly three 45-in. electrically-driven centrifugal pumps have been installed here. The building in which the pumps are placed also forms a sub-station for transforming the electric current which is supplied by the Southampton Corporation at 6,600-volts, to lower voltages as required for various uses on the dock estate.

At the western end of the estate, other culverts are being built to deal with storm water which now discharges on to the existing foreshore. The main outlet will be close to the graving dock entrance, and arrangements have been made that their discharge shall be boosted, if necessary, by passing the storm water through the graving dock pumps.

Bombay Port Trust

Amendments to the Docks Scale of Rates

At a meeting of the trustees of the Port of Bombay held on 27th June, 1933, the following were the main items of business disposed of:—

A Government notification was recorded appointing Commander A. R. Poyntz, D.S.C., R.I.M., as a member of the Board of Trustees vice Captain E. H. Dauglish, R.I.M., on leave.

Amendments of the Docks Scale of Rates were approved, subject to the sanction of Government, to provide for the levy of reduced wharfage on motor tyres, tubes and cigarettes shipped to and from West Coast ports.

Proposals were sanctioned for the re-investment, in Bombay and Calcutta Port Trust and Bombay Improvement Trust debentures, of Rs. 40 lakhs of the 4 per cent. Government Conversion Loan, 1916, due for redemption on 1st July. The major part of the scrip represents investments of the Provident Funds and General Sinking Fund for the repayment of loans.

The Port of New York

Latest Data issued by the Bureau of Commerce

Value of Foreign Trade at the Port of New York.

FOREIGN trade at the Port of New York in April, 1933, was valued at $77,405,000, which represents a falling off of 25 per cent. from last year's figure of $103,828,000. The percentage differences between monthly periods of this year and last are becoming smaller, not because of any upturn in the situation, but because foreign trade has reached a point so low as to be almost an irreducible minimum. The declining trend curve is flattening out.

	April		Net Change	
	1933	1932	Amount	Per Cent.
	$	$	$	
Exports	34,201,000	42,042,000	-7,841,000	—18·7
Imports	43,204,000	61,786,000	—18,582,000	—30·1
Exports and Imports	77,405,000	103,828,000	—26,423,000	—25·4

The first four months of 1933 show a total value of foreign trade of $327,625,000, which, compared with the same period last year, shows a decline of 26 per cent. Exports dropped 20 per cent., while imports were 31 per cent. less than last year.

	January-April		Net Change	
	1933	1932	Amount	Per Cent.
	$	$	$	
Exports	145,928,000	181,739,000	—35,811,000	—19·7
Imports	181,697,000	262,355,000	—80,658,000	—30·8
Exports and Imports	327,625,000	444,094,000	—116,469,000	—26·2

There is some encouragement in the recent upturn in exports of automobiles in April and May, 1933, as compared to a year ago. Exports of automobiles through the Port of New York gained 36 per cent. in the number of units and 4 per cent. in value for April, and 60 per cent. and 34 per cent. for May.

Volume of Foreign Trade at the Port of New York.

The volume of foreign trade at the Port of New York during the calendar year 1932 amounted to 14,804,000 tons, according to a recent report of the United States Shipping Board, representing a decline of 20 per cent. from the 1931 figure of 18,530,000 tons.

Volume of Foreign Trade, Port of New York

	Calendar Year		Net Change	
	1932	1931	Amount	
	Tons	Tons	Tons	Per Cent.
Exports	4,125,000	5,968,000	—1,843,000	—30·9
Imports	10,679,000	12,562,000	—1,883,000	—15·0
Exports and Imports	14,804,000	18,530,000	—3,726,000	—20·1

The year's foreign trade was marked by wide fluctuation in volume of imports, which were only 5 per cent. below the previous year's figures in the first quarter, with a gain of 9 per cent. in the second quarter, while the third and fourth quarters dropped 37 and 32 per cent. respectively from the corresponding periods in 1931. Percentage changes by quarters, in comparison with the volume in the same periods in 1931, are shown below.

Percentage Changes in Volume of Foreign Trade at the Port of New York in 1932 as compared with 1931

	Exports Quarters	Imports Quarters	Exports and Imports Quarters
January-March	—34·7	—5·3	—15·3
April-June	—31·2	+9·5	—4·3
July-September	—36·1	—36·6	—36·5
October-December	—23·9	—31·8	—29·5
Year	—30·9	—15·0	—20·1

Vessel Movement in Foreign Trade.

Entrances and clearances of vessels in foreign trade at the Port of New York in May, 1933, increased substantially over the previous month, but are still below the 1932 figures. Entrances in May numbered 401 vessels, as compared with 470 in that month last year, a decline of 15 per cent., while clearances were 408 as against 448 in May, 1932, a drop of 9 per cent. The net register tonnages of vessels entering and clearing were only 5 and 3 per cent. respectively lower than last year.

	May		Net Change	
	1933	1932	Amount	Per Cent.
Entrances, No. of Vessels ...	401	470	—69	—14·7
Clearances, No. of Vessels ...	408	448	—40	—8·9
Entrances, Net. Reg. Tonnage	2,192,783	2,316,788	—124,005	—5·3
Clearances, Net. Reg. Tonnage	2,163,750	2,223,388	—59,638	—2·7

The first five months of 1933, January to May inclusive, were 14 per cent. below the same period last year in entrances and 12 per cent. below in the clearances, as shown in the following table:—

	January-May		Net Change	
	1933	1932	Amount	Per Cent.
Entrances, No. of Vessels	1,956	2,274	—318	—14·0
Clearances, No. of Vessels ...	2,045	2,334	—289	—12·4
Entrances, Net Reg. Tonnage	10,473,241	11,655,800	—1,182,559	—10·1
Clearances, Net Reg. Tonnage	10,700,800	11,714,232	—1,013,432	—8·6

Steamship Sailings.

The month of May gives the first indication that regular sailings in foreign service are becoming more stabilised. Compared with May last year, 7 out of the 15 foreign routes listed report exactly the same number of sailings. The total decline in this category is only 17 sailings, or approximately 6 per cent., under May, 1932, whereas the monthly loss has been running close to 15 per cent.

Special cruises to foreign parts reflect the efforts of the steamship lines to regulate this traffic, which has proved one of New York's big attractions, and 7 were reported for May, which is the same number credited to that month last year.

Tankers usually operating between New York and foreign centres producing crude petroleum are less than half the number that operated in this trade a year ago, and indicate the effectiveness of the high tariff assessed on this commodity.

The grand total of all sailings from the Port of New York is off about 10 per cent., which is an improvement over April, when this loss was 15 per cent.

The peak day of the month was Saturday, the 27th, with sailings totalled 69 vessels. Included in this number were 37 in foreign service, of which 4 were to the United Kingdom, 1 each to Holland, Germany, France and Spain, 8 to Caribbean-Mexican ports, 3 to the River Plate, 1 to the Far East, 2 tankers and 3 special cruises. The 32 domestic sailings included 2 to the Pacific Coast, 6 to South Atlantic and Gulf ports, 5 tankers and 1 coal carrier.

Commerce at Port Newark.

Waterborne receipts at Port Newark in May, 1933, amounted to 21,143 tons, a decline of 18 per cent. from the same month last year. Receipts of lumber by steamer and lighter increased 3 per cent., while receipts of cargo other than lumber, which included 2,896 tons of perishable foods, mainly potatoes, dropped 22 per cent. Lumber shipped inland out of Port Newark during the month amounted to 13,523,000 board feet, of which 7,310,000 feet moved out by railroad car and 6,213,000 feet by truck.

Water-borne Receipts at Port Newark.

	May		Net Change	
	1933	1932	Amount	Per Cent.
All Commodities (tons)...	21,143	25,639	—4,496	—17·6
Lumber (board feet) ...	9,371,251	9,137,655	+233,596	+2·6
Other than lumber (tons)	16,457	21,070	—4,613	—21·8

During the first five months of the year, January to May inclusive, the volume of cargo discharged by vessel at Port Newark was 206,232 tons, which was 17 per cent. greater than in the same period last year. The increase was 3 per cent. in receipts of lumber and 26 per cent. in cargo other than lumber.

Water-borne Receipts at Port Newark.

	January-May		Net Change	
	1933	1932	Amount	Per Cent.
All Commodities (tons)...	206,232	176,860	+29,372	+16·6
Lumber (board feet) ...	54,341,626	52,902,338	+1,439,288	+2·7
Other than lumber (tons)	134,090	106,644	+27,446	+25·7

New York State Canal System.

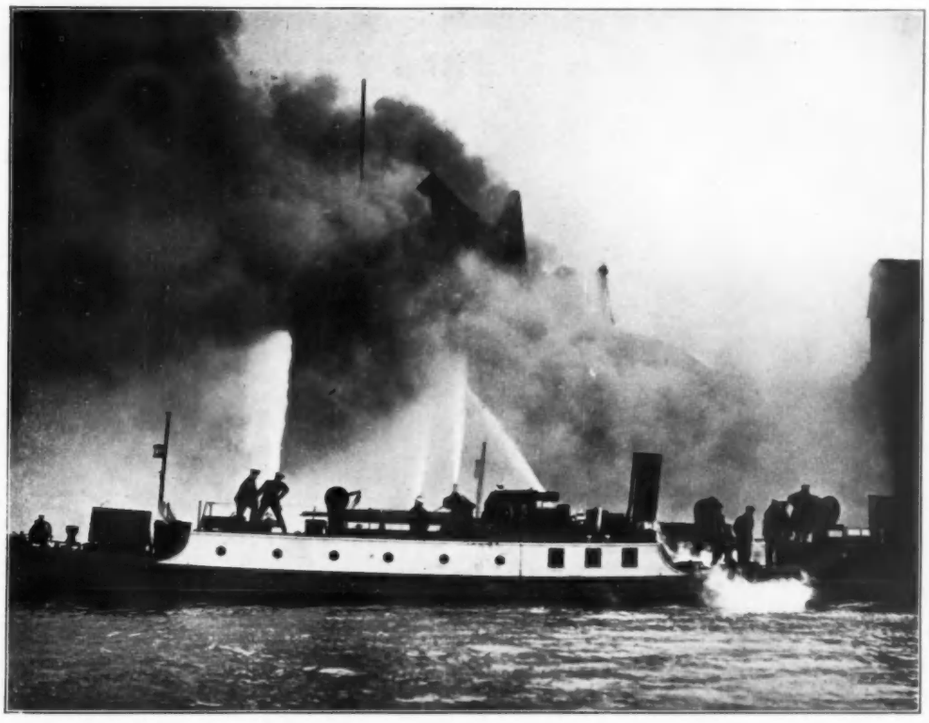
Despite a greatly reduced grain movement on the New York State barge canals, amounting to a decrease of almost 50 per cent., the total traffic this year up to June 17th has increased from 928,515 tons in that period last year to 972,906 tons in 1933, a gain of 5 per cent. Traffic in manufactured products, which has increased steadily for the past ten years, shows a gain of 18 per cent. in the above period over last year. Whereas the bulk of the canal traffic in former years has been east-bound, the last few years have shown a reverse of this condition. This is again evident this season, tending to show that the canal is becoming increasingly independent of grain shipments, which formerly constituted a very large part of the total traffic.

Fire Protection in Docks and Harbours

The Necessity for Efficient and Up-to-date Appliances

THE disastrous fire which caused enormous damage at the West India Docks in the Port of London recently, should emphasise the need of providing efficient protection against the ravages of fire in every port throughout the world. With the whole resources of the London Fire Brigade to call on, damage to the extent of £3,000,000 was sustained. Of late years this important question has been considered by a number of dock and harbour authorities, but at the present time there are many in which the protection arrangements against fire are far from being established on modern and efficient lines.

The fire risks are enormous, and can only be realised when full consideration is given to the immense amount of valuable merchandise stored in the dock warehouses and contained in the large number of ships' holds previous to discharging their cargoes. A large amount of the goods shipped from and consigned to the docks in all parts are of an inflammable nature. A fire occurring in any dock and harbour premises should always be looked on as a serious calamity, necessitating the employment of powerful and modern appliances in charge of highly-trained and officered fire brigades.



The London Fire Float "Beta III." at a Lambeth warehouse fire. Built by Merryweather & Sons, the Beta III. is a twin-screw vessel 70 feet in length with two six-cylinder engines each capable of developing 110 b.h.p. The two Merryweather three-stage turbine fire pumps are rated to deliver 1,000 gallons per minute, but on trials they each discharged 1,350 gallons per minute.

"Karbono" Fire Extinguisher.

The increasing use of oil in place of coal in the boilers of steamships, as well as the advent of the motor ship, has compelled dock authorities to arrange for the storage of fuel oil (both high and low flash) in large quantities. It is well understood that any considerable storage and use of oil and spirits invariably increases the fire risks inseparable from that always present in docks and harbours. In addition, in many parts of the world an immense amount of petrol and paraffin oil is generally found in large tanks or adjacent to docks and harbours.

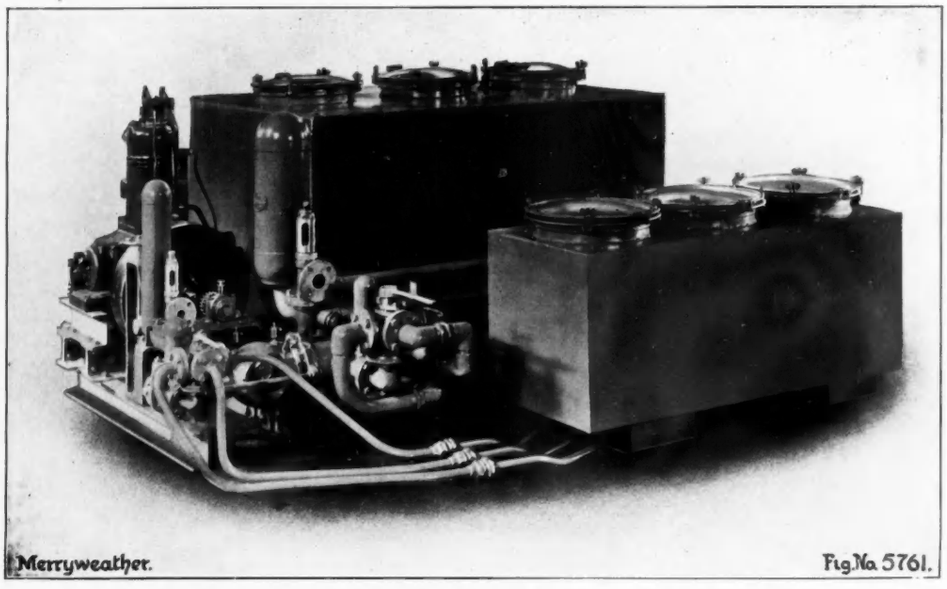
From the foregoing it is evident that exceptional fire risks have to be provided for, calling for special appliances to enable the staffs of the various undertakings to safeguard their property.

The appliances designed and in use for dealing with dock fires are of many and varied types, but beyond all doubt the most effective is a well-designed fire float. This is a specially-designed and constructed vessel fitted with powerful pumps. The size and pumping capacity of the boat are generally governed by the extent of the fire risks and the area of the property to be protected. The size and weight of the pumps fitted on a fire float have not to be considered in the same way as those designed for use on fire engines. Powerful streams of water can be projected direct from mechanically-operated nozzles from the decks of the float. Provision is also made for conveying several lines of hose from the boat through special delivery heads to threatened parts of the property. The pumps are generally of such a size that sufficient water can be supplied to feed several standard fire engines for dealing with fires at a distance from the dock premises.

The first fire floats supplied were steam-propelled, but of late years the motor float has been extensively adopted. Another

Fire Protection in Docks and Harbours—continued

system in use by many dock authorities is to fit powerful pumps to tug boats used in the docks and adjacent waterways. One disadvantage of this system is that when required for fire duty the tug is likely to be miles from the threatened area, whereas the fire float being stationed in a central position is prepared at a minute's notice to proceed to the scene of a fire.



"Fire Suds" Installation supplied for fixing in a fire boat for the Port of Suez.

In addition to the fire float, the provision of fire engines are generally considered necessary. These machines are of the petrol motor type and are used to reinforce the fire float, and also to deal with fires occurring at a distance from the water available in the docks.

Electric Submersible Salvage Pump.

Special apparatus is required to combat oil and spirit fires, consisting of appliances producing a foam-like substance, which being lighter than oil, has the effect of excluding oxygen from the above types of fire. The foam machines in service vary from small portable extinctors to motor vehicles fitted with pumps capable of pouring a continuous stream of the chemical mixture on any oil or spirit conflagration. An outbreak of fire in one of the large oil and spirit tanks is one of the most dreaded catastrophies fire brigades have to contend with. The system generally adopted for dealing with this is to concentrate as many high-powered streams of water as possible on the tops and sides of the adjoining tanks and to attack the contents of the one on fire with the foam mixture supplied from fixed pumping plants delivered through iron pipes to the level of the burning oil.

The various warehouses and buildings should be well provided with numbers of small portable hand-worked appliances to deal with fire outbreaks in their initial stages. In many instances the prompt use of these small appliances have been successful in confining the fire to small dimensions, rendering the work of the fire brigade much easier and greatly decreasing the loss.

The installation of efficient salvage apparatus for use in connection with shipping wrecks is an urgent necessity in all docks and harbours. It has been demonstrated that the duties of fire protection and salvage work are so closely allied that the practice of late years has been to combine the two under one authority. The usual pumps carried on the float are in many instances supplemented by powerful centrifugal pumps working through fixed suction heads to which several lengths of light suction hose are attached and run to the damaged holds of a wrecked or leaking ship.

A submersible pump has been designed and used with most successful results in many parts of the world. This apparatus consists of a centrifugal pump fixed on the outside of a water-tight tank, worked by an electric motor from the inside. Water-tight electric connections convey the current from the dynamos on the fire float or from the ship's machinery. The weight and size of this outfit is very small allowing it to be easily conveyed to the ship requiring assistance and lowered to the flooded holds.

In conclusion, it is evident that a system of detecting and giving the alarm of an outbreak of fire is necessary. There are many types of fire alarms in use, but before deciding on any particular make, a complete survey of the property, risks and fire brigade organisation would be necessary. All warehouses and other buildings should be fitted with alarm contact points, which are in direct communication with the fire brigade station. On pressing the contact point in any part of the property the alarm is sounded in the fire station and by means of an indicator board the exact location of the fire is also given, thus allowing the brigade to proceed direct to the threatened point.

The Manchester Ship Canal Company.

The traffic receipts for the month of June, 1933, amounted to £93,982 against £101,095 in June last year, a decrease of £7,113.

The traffic receipts for the half-year ended 30th June, 1933, amounted to £574,959 as compared with £596,079 for the corresponding period of last year, a decrease of £21,120.

The net revenue of the whole of the undertaking for the half-year (after providing for interest and fixed charges) was £9,467, less than the corresponding half-year in 1932.

North-East Coast Notes.

Visitors to Blyth Harbour.

MEMBERS of the Council of Newcastle and Gateshead Chamber of Commerce visited Blyth Harbour on June 28th. The members of the Council had never had an official invitation to see Blyth Harbour, and it was on this account that the invitation was sent and accepted. The principal object of the visit was to see what improvements had been made in the coal shipping facilities, more particularly in regard to preventing coal breakage. Apart from the belt conveyors and the Handcock appliance at the West Staiths, a new telescopic arrangement is being tried for minimising breakage of screened coal. This consists of a hopper with a telescopic tube attached to it, which reaches to the bottom of a ship's hold; the coal travels down the spout into this appliance, and by degrees the telescopic sections are lifted from the bottom upwards, thus allowing a cone to be formed which will reach practically to the bottom of the spout, and when this has been done, the appliance is removed and teeming takes place under the ordinary conditions. It has been in operation for between two or three months and can be used on the boats which are engaged on the coastal service, into which it was not possible to work the Handcock anti--braking appliance, and so far as information is available the results are satisfactory.

Sir Arthur Sutherland, President of the Chamber of Commerce, and Mr. Charles Irwin, Vice-President, were present, accompanied by Col. A. Henderson, Messrs. W. J. Hardie, A. Kelly, H. E. Anderson, C. M. Morton, H. A. Haslam, J. Arnott, G. S. F. Ritson, and others. The party were received by Mr. Ridley Warham, Chairman of Blyth Harbour Commission, and Mr. R. M. Sutton, Vice-Chairman, and were conducted round the harbour.

Coal Shipments from Blyth during May.

At the June meeting of Blyth Commission Mr. Warham, the chairman, submitted particulars of the coal shipments for the month of May as well as for the five months of the current year. The shipments were: May, 1933, 451,478 tons; 1932, 364,077 tons; 1913, 412,885 tons. For the five months ended the 31st of May, the shipments were:—1933, 2,246,190 tons; 1932, 2,086,498 tons; 1913, 1,931,695 tons. The total shipments for the five months show an increase of 8 per cent. on 1932 and 16 per cent. on 1913.

Losses on River Tyne Ferries.

The continued financial loss incurred by the River Tyne Commission in the running of the direct and Whitehill Point Ferries between North and South Shields was considered at the meeting of the Commission in June. The Ferries Sub-Committee recommended that owing to the continued loss the Commission should seek power in their next Parliamentary Bill to secure release from the statutory obligation imposed upon the Commission to maintain the ferries, and that in view of this the Commissioners and the Tynemouth and South Shields Corporations should meet to discuss the question. Alderman T. Sykes, moving the report, said that the recommendation for Parliamentary power to be obtained to release them from the obligation to run the ferries, did not determine whether or not the Commission should run them. The report was adopted, but it was agreed that the Tynemouth and South Shields Corporations should be consulted, and that before application was made to Parliament the matter should be referred to the Parliamentary Committee of the Commission.

Smart Work at Dunston.

The comparative quietness in the coal trade has not lessened the desire on the Tyne to maintain its reputation for smart work. The London and North-Eastern Railway Co. report a very good performance in the loading of the steamer "Torchbearer" at Dunston. On June 21st the steamer was put under the staiths to receive 1,860 tons of gas coal, and 60 tons of bunkers, the boat was berthed at 9 a.m. and loading was completed at 11.50 a.m., including 15 minutes for the bunkers. The time created a record for Dunston, having regard to the quantity taken aboard. The average worked out at 740 tons per hour for the cargo. The vessel left at 12.15 p.m. the same day.

Tyne Coal Shipments still Declining.

Despite the very considerable number of coal orders recently booked by collieries shipping mainly from the Tyne, the coal and coke output from the river still shows a tendency to decline. Up to the end of May the shipments had totalled 5,208,870 tons, which was more than 3,000,000 tons less than the figures for the corresponding period of 1913, and 214,474 tons less even than the five months of the year. It is satisfactory to note that notwithstanding the large amount of shipping idle at the moment, the bunker coal trade is very steady, and for May showed a small increase. The imports of petroleum also were larger, the arrivals for the five months of this year being 23,229 tons which was more than double the quantity imported in the like period of 1932.

Sunderland's Deep Water Quay.

Sunderland Town Council has approved the report of the Deep Water Quay Committee which recommended an estimated expenditure of £15,782 on the construction of heavy steel sheet piling curtain walls for the protection of the marl rock along the quay retaining wall, and they further advised that the tender of Messrs. Peter Lind and Co., for carrying out the work be accepted. The Mayor (Alderman Brown), explained that this work was necessary owing to circumstances which could not be foreseen when the quay was commenced and it was strongly recommended by a specialist who was called in. He added that the lowest tender had been accepted.

Decrease in Imports and Exports at Sunderland.

The trade statistics for the Port of Sunderland for the first five months of this year, show that there had been a decrease of 383,852 tons in the coal and coke shipments, the total having been 1,677,242 tons. Other exports totalled 17,328 tons compared with 19,144 tons for the similar period of 1932. The chief exports were: Iron and steel 426 tons, pitch and tar, 7,015 tons, petroleum 5,550 tons and sundries 4,213 tons. The imports at 100,090 tons showed the small decrease of 3,069 tons. The leading imports were: timber 15,033 loads, grain, 8,123 tons, esparto 9,163 tons, cement 7,552 tons, pretroleum 32,730 tons, and snndries 22,048 tons.

A Hartlepool Shipping Record.

There was a record shipment of coal and coke from the Hartlepools on July 3rd, when 19,080 tons were shipped from the port. The previous highest shipment from the port in one day was 18,476 tons on July 30th, 1928. The total exports at the Hartlepools for the first six months of this year were 1,557,053 tons, a decrease of 55,215 tons compared with last year. The imports of timber into the port for the first half-year totalled 54,808 loads compared with 113,621 loads for the same period of last year.

Tees-side Imports of Foreign Iron and Steel Declining.

Imports of foreign iron and steel into the Teesside district are gradually lessening. Statistics presented at the July meeting of the Tees Conservancy Commission showed that during June only 1,204 tons of iron and steel were imported, and during the eight months ended June, 10,599 tons were imported, as against 101,480 tons in the corresponding period of 1931-32.

Tyneside Honour.

Satisfaction was expressed at the announcement that Major T. Russell Cairns had been chosen as president-elect of the Baltic and Maritime International Conference, in succession to Mr. W. A. Souter, also a Newcastle business man. Major Cairns is a director of the Cairn Line of Steamships, Ltd.

Granton Harbour, Edinburgh

New Crane Equipment

The directors of Granton Harbour, Ltd., have decided to equip the deep-water wharf at Granton Harbour with four 3-ton electric travelling cranes.

These cranes have been specially designed for the rapid discharge of esparto grass and general cargoes and are also equipped with grabs.

The contract for the cranes, which are being built to the specification of the Superintendent and Engineer, Mr. J. H. Hannay-Thompson, Jr., B.Sc., A.M.Inst.C.E., has been placed with Messrs. Cowans, Sheldon and Co., Ltd., Carlisle, and the contract for the electrical installation has been placed with Messrs. Mitchell Graham and Son, Edinburgh.

The directors are pursuing a very active programme of reconstruction and improvements. An extensive dredging scheme has recently been completed which has given a much greater depth of water alongside the wharves.

The timber wharves are being reconstructed and strengthened which will enable them to carry heavy traffic. About 500-ft. of the wharves has already been completed.

The coaling cranes at Granton Harbour are capable of handling up to 300 tons of coal per hour, and have just been completely overhauled.

Concrete and its Many Uses in Docks and Harbours

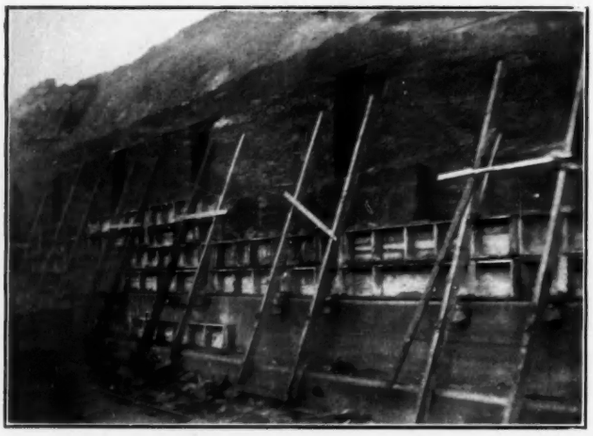


Fig. 4. Herculaneum Graving Dock, No. 4, showing dovetails in rock.

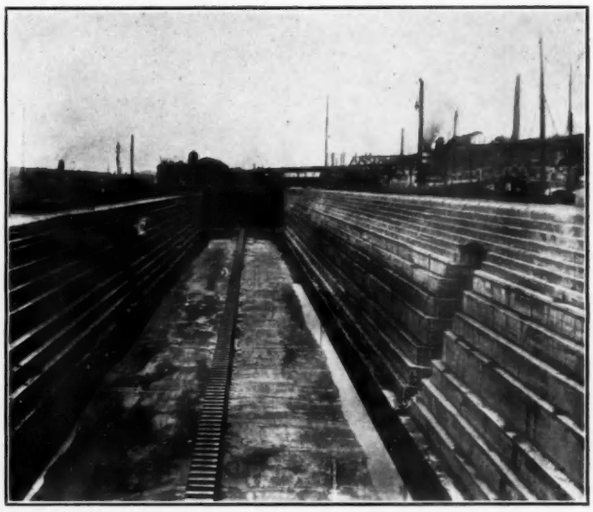


Fig. 6. Herculaneum Graving Dock, No. 4. General View showing Access Steps.

Fig. 5. Herculaneum Graving Dock, No. 4, showing partly constructed Crane Gantry.

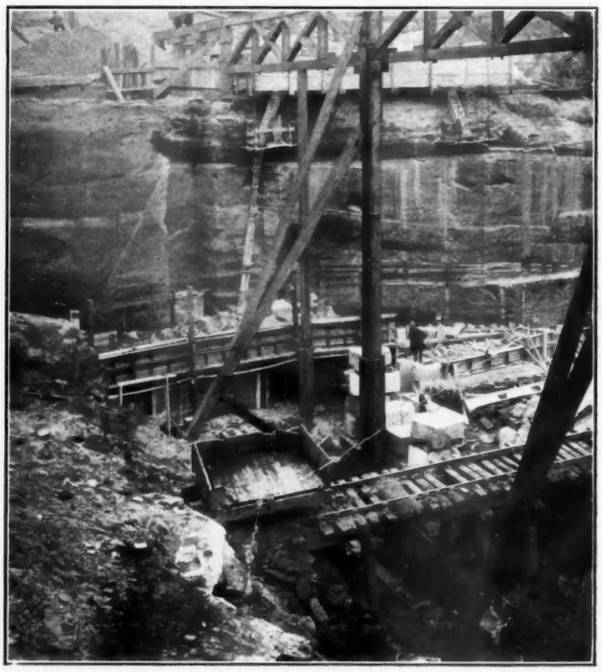


Fig. 7. Herculaneum Graving Dock, No. 4.

Fig. 9. Herculaneum Graving Dock, No. 4, showing travelling concrete stage.

Fig. 8. Herculaneum Graving Dock, No. 4. Gate Recess and Hollow Quoins, East Wall.

Concrete and its Many Uses in Docks and Harbours—II

By W. A. LINSKILL, M.Sc., A.M.Inst.C.E.

Fig. 1. A "Simpson" Dry Dock in course of construction.

Fig. 2. Herculaneum Graving Dock, No. 4, showing completed dock with older ones on left.

GRAVING DOCKS OF OTHER MATERIALS.

Masonry.
Masonry and concrete.
Concrete and brickwork.
Masonry, concrete and steel.
Timber.

CONSTRUCTION OF A MASS-CONCRETE GRAVING DOCK.

Excavation.
Concreting.
Modern method of concreting.

Graving Docks of other Materials

BEFORE proceeding to describe the construction of a mass-concrete graving dock, it may be of interest to note what other materials have been used in the past.

Masonry.

Under ordinary conditions it was usual to build the walls and floor of a graving dock of rubble masonry faced with ashlar, and using any suitably hard and durable stone, whilst granite almost invariably was and still is used for quoins, sills, slides, copings and other parts exposed to hard wear.

Alternatively to solid masonry and sometimes in combination with it, we find brickwork, concrete (as backing) and even timber. A few instances will be given.

The first two graving docks in the Herculaneum Basin at Liverpool, which were built about 1865, were excavated in the solid rock and lined with ashlar masonry of Runcorn stone. The two later dry docks here were of mass-concrete.

Masonry and Concrete.

A dry dock at Barry, built about 1893, has a concrete floor and limestone masonry walls.

An old dry dock at Glasgow, dating about 1895, was of ashlar masonry, a later one of about 1898 had concrete walls and a brick invert under the concrete floor.

Two graving docks at Buenos Aires constructed about 1897 had walls of granite rubble masonry with altars, copings and steps of granite ashlar.

Under the concrete floor of one dock was a brick invert laid on concrete. The second dock floor was entirely of concrete except for a paving of granite setts which covered both floors.

A dry dock, constructed at Hong Kong about 1860, and a later one about 1867, had their rock sides lined with coursed granite about 4-ft. thick.

In 1888, a larger dock was built of concrete containing large granite " plums " and faced with dressed granite altars.

At Penzance a small graving dock built in 1884 had the upper portion of its walls of granite masonry, the lower steps and floor being cut to the required shape from the solid rock.

Concrete and Brickwork.

During the construction of a concrete dry dock at Tredegar, Newport, Monmouth, in 1902, difficulties arising from quicksand and water-bearing strata led to the use of monoliths for a certain length of wall. The greater number of these monoliths had brick walls, the remainder concrete.

Masonry, Concrete and Steel.

In two instances, French engineers overcame the difficulty of bad foundations by building their dry docks inside caissons large enough to contain them. The caisson at Toulon was 600-ft. long by 116-ft. wide, and that at Le Havre was 1,132-ft. long by 196-ft. wide.

Once the caissons were in position and sunk to the required level, the building of the masonry and concrete walls and floors presented no unusual difficulty.

Timber.

To build a dry dock entirely of timber seems inappropriate for a structure subjected to peculiar stresses and severe wear, and where strength and permanence are eminently desirable, yet at

Fig. 3. Herculaneum Graving Dock No. 4. Steam Navvy on "bottom cut" and Overhead Crane Working on Gantry.

Concrete and its Many Uses in Docks and Harbours—continued

one time there were a number of timber-built dry docks on the western shores of the Atlantic. No doubt the abundance and cheapness of timber in that part of the world led to its extensive use for a variety of structures which in the older countries were built of brick or stone.

Some of these timber dry docks—called Simpson docks after their inventor—attained considerable size, up to 600-ft. in length with an entrance width of 70-ft. Our first illustration shows one of these timber dry docks.

This form of construction had its drawbacks. The maintenance cost was high, seepage was always a trouble, and sometimes the floor would lift. A remedy for the latter was to substitute a concrete floor.

Thus from solid masonry throughout masonry walls and concrete floor, masonry facing with concrete backing, the use of concrete has progressed steadily until at the present time the whole of a graving dock, except for a few important granite stones, is carried out in concrete.

Concrete is so easily moulded into any required shape that it is an ideal constructive material for graving docks, with their many curves, recesses, steps, angles and culverts.

Fig. 10. Herculaneum Graving Dock, No. 4. Travelling Concrete Stage.

Construction of a Mass-Concrete Graving Dock

Herculaneum Graving Dock No. 4.

In the Herculaneum Basin at the south end of the Liverpool Docks are four dry docks side by side. Of the three older ones, two are built of masonry, the fourth, about to be described, was completed in 1905 and is of mass-concrete. See illustration No. 2.

This dock is 750-ft. long inside the gates and has an entrance width of 80-ft. The height of the walls averages 40-ft. and the depth of water 27-ft. above the gate sill. The total depth of dock from coping to foundation is about 50-ft.

The floor thickness averaged 4-ft. 6-in., and the walls at the altars about 6-ft., whilst those at the entrance were about 15-ft. thick. The head of the dock was semi-circular, with two flights of steps. About 34,000 cub. yds. of concrete and 19,000 cub. ft. of granite were used, and over 178,000 cub. yds. of excavation removed. The cost, exclusive of the gates, was about £80,000.

Excavation.

As the ground was tough red sandstone it was not necessary to build the walls in trenches, so the centre portion of the excavation or " dumpling " was got out by steam navvy after the rock had been loosened by the judicious use of explosive. See illustration No. 3. This main excavation was kept sufficiently far from the sides to prevent damaging them, and to allow for the various rock-steps to be carefully trimmed down afterwards to the exact section required.

Three steps were thus formed in the rock sides, and dovetails, 4-ft. wide on the face and 5-ft. wide at the back, were cut in the upper two steps for the full height and width of the step. These dovetails were spaced at 25-ft. centres, the upper ones being midway between the lower ones. These formed an excellent key for the concrete wall. The illustration No. 4 shows these very clearly.

The excavation from the navvy was loaded into side-tip wagons, which were hauled by a steam locomotive up an inclined track laid on a benching specially left on one side of the dock for this purpose, then round the head of the dock and so to the chute, where it was tipped into barges.

When this excavation had been taken out to within about 15-ft. of the bottom, a timber gantry was erected right across the dock entrance, and a 10-ton steam overhead travelling crane worked on this, hoisting wagons out of the bottom and travelling across with them to the chute. (Illustration No. 5.) By this means the excavation of the entrance by hand proceeded simultaneously with the bottom cuts of the steam navvy.

It was necessary thus to expedite the work at the entrance so that the erection of the gates should not be unduly delayed but brought into line with the general time schedule.

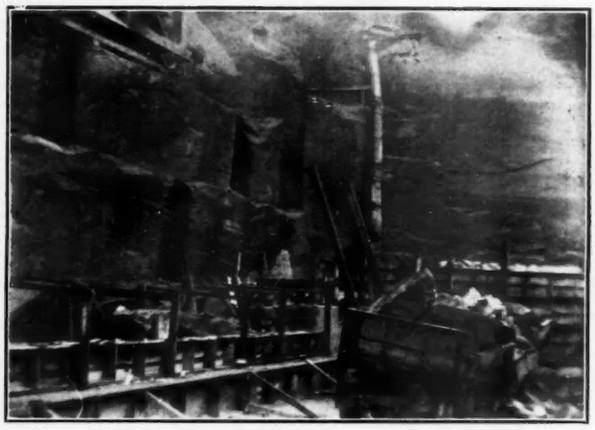


Fig. 13. Herculaneum Graving Dock, No. 4. Shuttering.

Concrete.

There were generally two qualities of concrete, 6 to 1 in the 12-in. thick facing to all walls and in the upper layer of the floor concrete and 8 to 1 in the remainder of the walls and floor.

The surface of the floor was level longitudinally and had a camber of 9-in. across from the centre to sides. The drainage was effected by a 2-ft. wide channel at each side, formed in the concrete, and with grid-covered openings every 25-ft. connected to a 4-ft. diameter culvert underneath, also formed in the concrete, and which had a fall of 1 in 300 towards the sump.

The two qualities of concrete in the walls were separated by a " parting iron " which was lifted out as soon as both kinds were brought up to the same level.

There were four sets of access steps, down the centre of each of which was laid a granite slide. These steps were of 4 to 1 concrete. (Illustration No. 6.)

The aggregate was shingle ballast and sand, brought to the site by barge. Suitable pieces of rock from the excavation were reserved and stacked for use as " plums " in the concrete. Some of the illustrations show these projecting above the concrete to form a bond for the next layer.

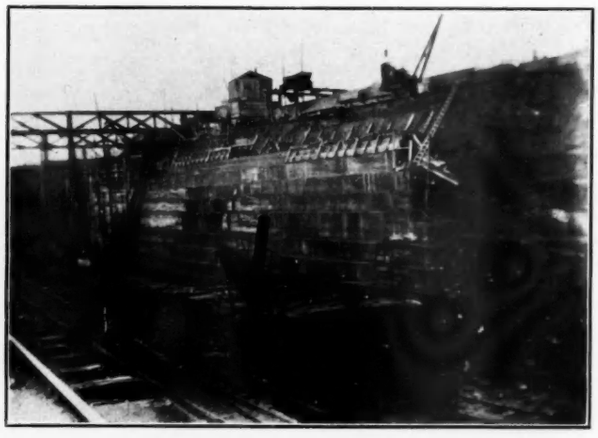


Fig. 14. Herculaneum Graving Dock, No. 4. East Wall.

Method of Concreting.

As all the concrete was below ground level, and most of it at a considerable depth, it was decided to let gravity do the actual work of mixing the concrete. In accordance with this, a type of mixer was used called the " Automatic Gravity Mixer." Many of these contrivances were used, and proved satisfactory.

This mixer was a very simple affair, consisting merely of an iron trough of rectangular section and about 10-ft. long. At the upper end was a hopper mouth into which the dry materials were shovelled or tipped from a measuring gauge or box. At the lower end was a hinged flap or gate, which could be set at any desired opening to maintain a steady flow of concrete. Inside the trough were baffle plates and cross-bars, which probably constituted the special feature of the apparatus and which effected the actual mixing. A water pipe in which holes were pierced at suitable intervals traversed the mixer and discharged jets of water on to the moving mixture. The machine was

Concrete and its Many Uses in Docks and Harbours

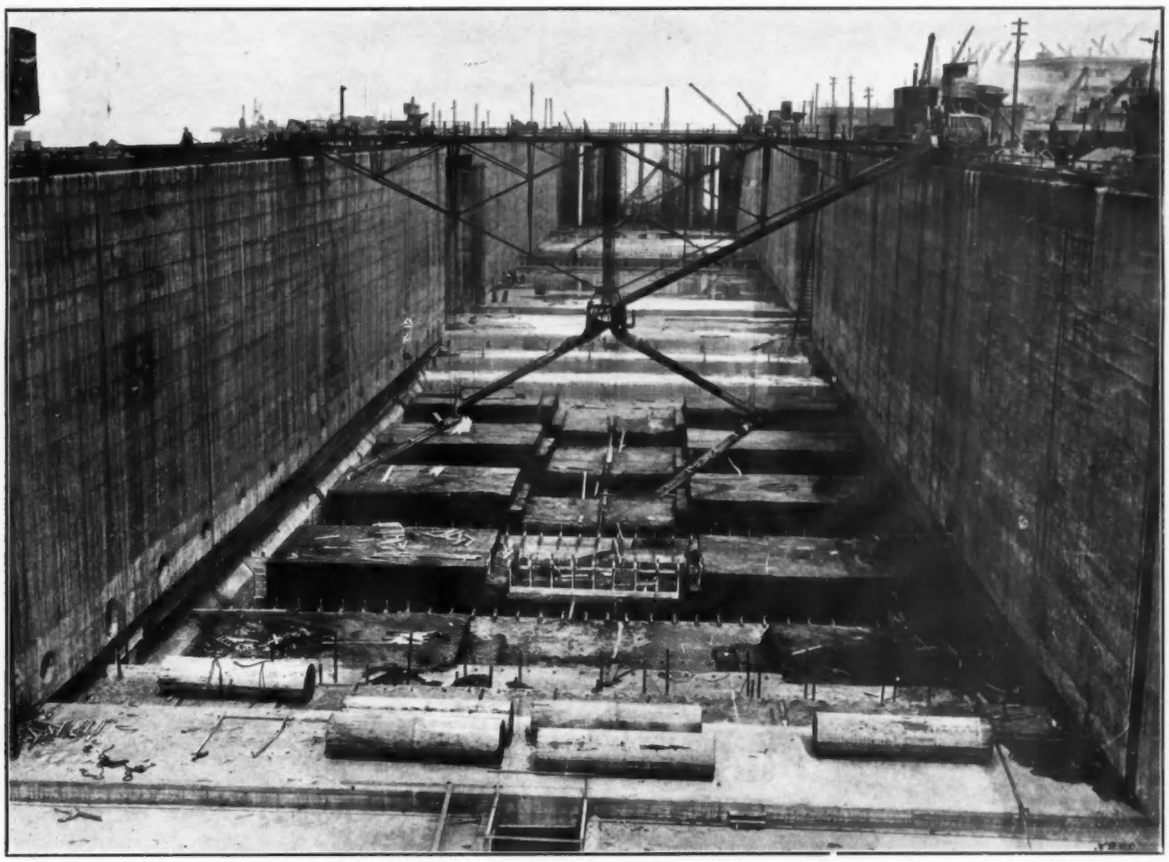


Fig. 11. Gladstone 130-ft. River Entrance Lock, Liverpool.

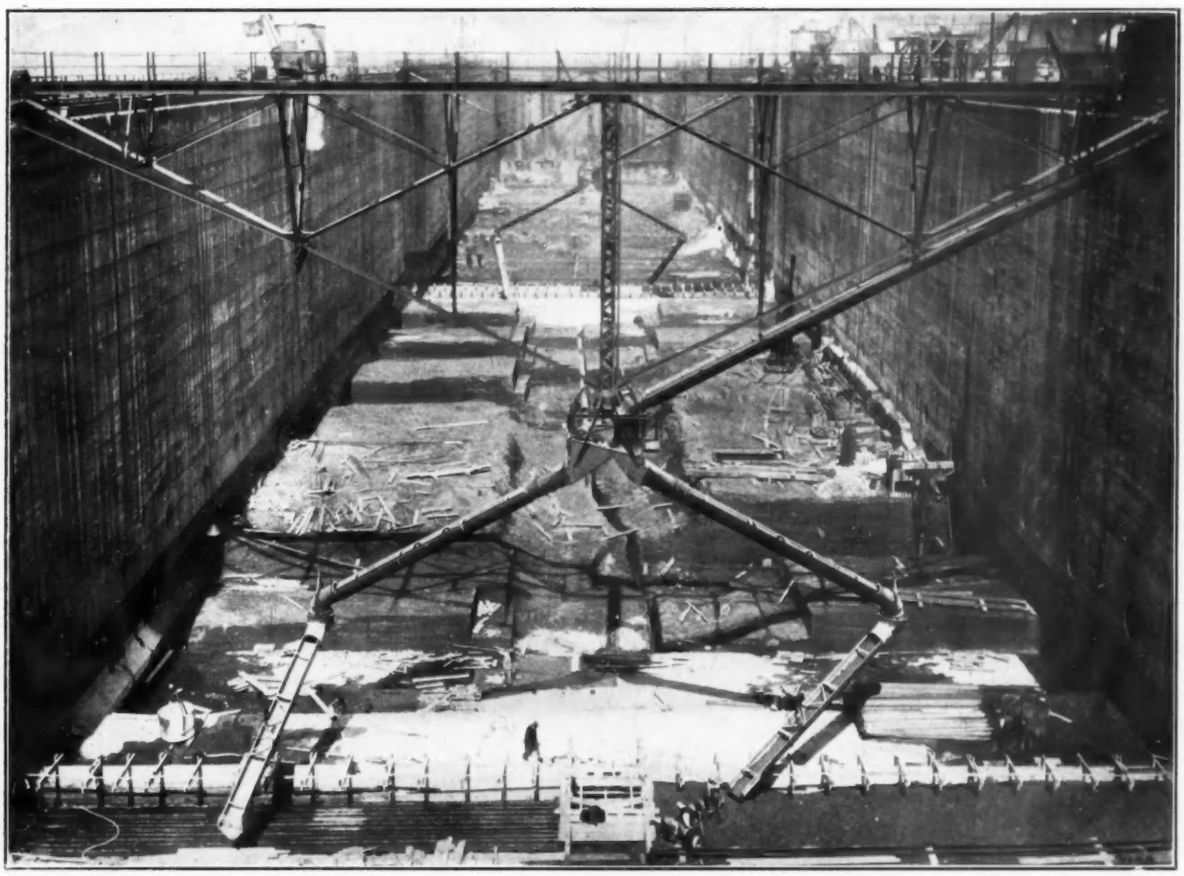


Fig. 12. Gladstone 130-ft. River Entrance Lock, Liverpool

Concrete and its Many Uses in Docks and Harbours—continued

used in an inclined position, the best angle of slope for any consistency of concrete being determined by trial.

At the entrance of the dock where the walls were thick, two of these mixers suspended from a large stage served to concrete part of the sill and a length of wall sufficient to include the gate recess and filling culvert. (Illustrations No. 7 and 8.) To the lower end of these mixers were suspended by light chains a series of iron chutes. These were made in about 6-ft. lengths, each length hanging by two short chains from the length above and having its upper end slightly splayed outwards to fit loosely over the lower end of the length above. The adoption of chain couplings rendered these chutes very flexible, thus increasing the working area over which they could deposit concrete. They were oval in cross section and were stayed inside with iron bars at various angles. These stays further mixed the concrete and also prevented its free fall, which in a height of 30-ft. or more would have caused segregation of the materials.

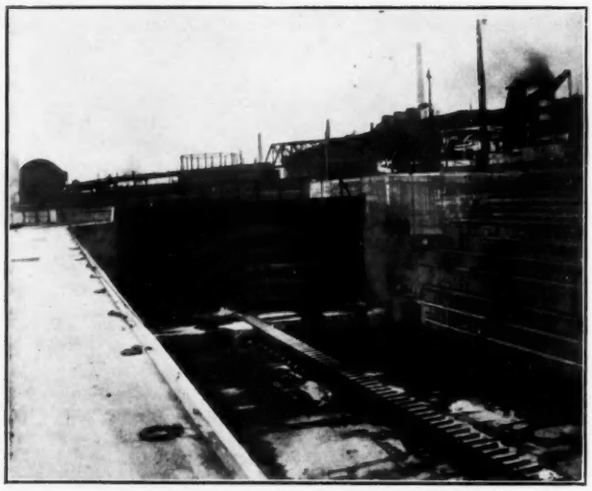


Fig. 15. Herculaneum Graving Dock, No. 4. Entrance Gates.

To concrete the stepped walls where their section was much thinner, frequent movement of the mixer was necessary. To accomplish this economically and expeditiously a travelling stage was devised with four double-flanged wheels, two running on a rail laid near the edge of the dock and two on a rail laid on the upper rock-step.

A strong wooden frame supported the stage, and when the mixer was suspended from the edge it overhung the wall as required. With a locomotive and wire rope it only took a few minutes to move this stage about. The locomotive travelled on a track laid behind the stage and parallel with the dock. This track was used to convey concrete material to the stage Illustration No. 9 shows this stage with chutes attached.

When the wall reached the height of the rock-step, this arrangement had to be abandoned, and in its place an ordinary railway ballast wagon was used.

The floor of the wagon was extended, new sides built and the mixer again suspended. The single rail was replaced by a track on which the wagon could travel.

By this means the wall was brought up to coping level. Illustration No. 10 shows the relative positions of the wall and the mixer in this case.

It may be mentioned here that the length of 6-ft. for the sections of chute was determined by the fact that the specification limited the free fall of concrete to a maximum of 6-ft.

Compared with modern methods, the above may seem somewhat old-fashioned. It was none the less efficient and produced satisfactory concrete. The substitution of a petrol-driven mixer would doubtless have speeded up the work, but only in the thicker walls and the floor.

A possible advantage possessed by the chutes described above is that they would and did convey and deposit " plastic " concrete, whereas the modern inclined chutes require the concrete to be in a more fluid state. It must also be pointed out that this concrete was by no means hand-mixed—it was only hand-loaded into the mixer.

Shuttering.

The shuttering was all made of wood and was of the " box " type. The special shapes required for the access steps, curved filling, culverts, bell-mouths, etc., gave the carpenters some furious thinking to do, but they overcame all difficulties satisfactorily. The illustrations show the various shuttering and methods of support. Illustration No. 14 shows the section of stepped wall; illustration No. 15 shows the entrance gates, keel blocks and east wall.

Recently constructed concrete graving docks at Liverpool, London, Southampton and Tilbury have been so fully described that they are familiar to all who are interested in dock work.

They represent the use of concrete in quantities whose very large aggregate amount affords convincing proof of its supreme utility for this class of work.

Modern Method of Concreting.

By the courtesy of Mr. T. L. Norfolk, Engineer-in-Chief to the Mersey Docks and Harbour Board, we are enabled to give reproductions of two photographs of some recent concrete work carried out under his direction at the Liverpool Docks. (Illustrations No. 11 and 12.) The illustrations are of the Gladstone 130-ft. River Entrance Lock and show the construction of invert and concrete distributors. These, with the rotary mixer, constitute the modern improvement on the methods already described, with which they form an interesting comparison. It will be noted what a large area of concrete such an arrangement can command.

The Port of London Authority

London's Shipping.

During the week ended July 7th, 1,164 vessels, representing 1,090,907 net register tons, exclusive of those in ballast, used the Port of London; 553 vessels (885,655 net register tons) were to and from Empire and foreign ports and 611 vessels (205,252 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended July 14th, 1,063 vessels, representing 970,390 net register tons, exclusive of those in ballast, used the Port of London; 519 vessels (774,247 net register tons) were to and from Empire and foreign ports and 544 vessels (196,143 net register tons) were engaged in coastwise traffic.

* * * *

During the week ended July 21st, 1,122 vessels, representing 998,778 net register tons, exclusive of those in ballast, used the Port of London; 523 vessels (814,670 net register tons) were to and from Empire and foreign ports and 599 vessels (184,108 net register tons) were engaged in coastwise traffic.

Tilbury Passenger Landing Stage.

Saturday, July 8th, was a record day at the Tilbury Passenger Landing Stage when 8 vessels, representing 110,905 gross register tons, embarked or disembarked 2,441 passengers.

* * * *

During the month of June 55 vessels, totalling 625,127 gross register tons, used the landing stage. Altogether 14,696 passengers were embarked or disembarked, in addition to baggage and mails.

* * * *

For the week ending July 22nd, 6,258 ocean travellers used the Tilbury passenger landing stage. This is a record. Of twenty-one vessels ten were engaged in cruising.

Personal.

Mr. R. H. Yapp has joined the staff of Thomas Smith and Sons, the old-established crane makers of Rodley, Leeds, on the representative side, and is already reporting very favourable prospects, the recent acceleration in building and development projects having created an increasing demand for their well-known steam loco cranes and excavators.

Ruston-Bucyrus, Ltd.

Messrs. Ruston-Bucyrus, Ltd., the well-known manufacturers of excavating machinery, of Lincoln, England, has just issued a new catalogue describing the Ruston-Bucyrus No. 4 Universal Excavator.

Several modifications have been made in this Universal ½ yard Excavator, and these are shown in the new catalogue. The catalogue, which is very well illustrated, also contains particulars of three types of tunnel shovels and also a special type of drop-hammer pile-driver.

Any of our readers who are desirous of obtaining a copy of this catalogue can do so by writing to Ruston-Bucyrus, Ltd., Lincoln, mentioning publication R.B.1177 and this Journal.

Scottish Harbour Notes

Repairs to Victoria Harbour, Dunbar.

FOR some time past Dunbar Town Council has been in negotiation with the Fishery Board for Scotland regarding a grant for repairing a part of the Victoria Harbour (known as the "Snatch"), and it was confidently hoped by the local authority that this request would be met. It is learned, however, that the Town Council has now received intimation from the Fishery Board of their inability to give such a grant owing to the limited funds now at their disposal and owing to the commitments which the Board have already entered into. Realising the necessity for immediate action, however, the Town Council has now unanmiously decided to proceed with the repair of the damaged section of the harbour, and this work will probably occupy some months in completion. Locally there is a feeling of great disappointment at the decision of the Fishery Board not to give a helping hand in this scheme.

Stonehaven Harbour Board.

It has been agreed by Stonehaven Harbour Board to carry out repairs to the local harbour at a cost of £1,400. In connection with this scheme the Harbour Board had made representations to the Fishery Board for Scotland for a grant, but the reply from the Fishery Board was to the effect that they could not hold out any hope of a grant for the entire scheme as suggested. The Board mentioned, however, certain necessary repairs estimated to cost £1,400, for which they offered a grant of £700 on condition that the Harbour Board bore the rest of the cost. In the circumstances the Harbour Board agreed to accept this offer, and it has been decided to take tenders for the work and to ask the harbour engineers (Messrs. Henderson and Nicol) to give an estimate of the cost of the material alone.

Greenock Harbour Trust and the Road and Rail Traffic Bill.

Greenock Harbour Trust have taken action over Clause 29 of the Road and Rail Traffic Bill, which empowers railway companies to divert traffic from coastwise shipping by offering exceptional rates against which coastal shipping could not compete. In a letter to Sir John Sandeman Allen, M.P. (Chairman of the Coastal Trade Development Council), the Chairman of the Trustees of the Port and Harbours of Greenock states:—"The Trustees are much concerned at the proposal in the Bill to exempt the railways from the law of undue preference in respect of agreed charges and have approached their local members of Parliament on the subject. In the opinion of the Trustees to exempt the railways from the law of undue preference in respect of agreed charges would place in the hands of the railway companies power to quote rates which, whilst having no connection with road competition, might be used in a manner which would militate against the normal use of the coastwise shipping services and the ports into which coastwise vessels operate, among which is the Port of Greenock."

Clyde Trustees and Finnieston Bridge.

It is intimated that the Clyde Trust could not see its way to give effect to a recommendation on the part of Glasgow Corporation to reduce the height of the clearance under the proposed new high level bridge at Finnieston. A Corporation Committee (discussing the question of gradients) recently expressed a desire to reduce the height of the bridge, as there would be a saving of £1,000 for each foot the bridge could be lowered. The position of the Clyde Trust, however, is that they cannot agree to any reduction having regard to the increasing size of the ships using the harbour above Finnieston, the reconstruction by the Trustees of General Terminus Quay now nearing completion at an estimated cost of £160,000, and the deepening of the berthage there from 18 to 24 feet at low water, carried out on the footing that there would be a clearance of 76-ft.; also the equipping of the quay by the London, Midland and Scottish Railway Company with coal belt-conveyor plant, all for the purpose of accommodating larger ships, to which the arrangement with the Corporation for altering the height of the masts and funnels of regular trading ships to pass under the bridge could not apply; the strong objections submitted by the two local shipowners' associations to any reduction in the clearance; and the relatively small saving in cost by lowering the height as compared with the permanent injury which would be done to shipping interests.

Kirkcaldy Harbour Affected by Marine Insects.

It is reported that serious damage has been caused at Kirkcaldy Harbour through the ravages of marine insects and that the sum of £3,000 will be required to effect the necessary repairs. The local Burgh Surveyor, reporting upon the wood piling at the East Jetty of the harbour, states that this is now badly decayed, and he recalls that he reported upon this matter in November, 1927, and that since then the lower framing had become very much worse. He proposed that the lower portion of each of the framed trusses should be thoroughly cleaned and encased in concrete for a height of 11-ft. below low water mark, and that the concrete be taken down to rock level—a scheme which would probably cost £3,000. It has now been decided by the local Town Council to proceed with this scheme, and it is intended that the expense should be spread over a number of years.

Port of Southampton Topics

Dock Statistics for June the Best this Year.

JUNE'S statistics for Southampton Docks are the best set for the first half of this year. Seven of the ten headings under which the traffic of the port is classified show an increase over the corresponding month of 1932. The number of vessels decreased from 317 to 305 inward and from 322 to 312 outward, but the gross and net tonnage returns showed gratifying increases. The gross figure inward was 1,812,351 tons, as against 1,376,426 tons, an advance of 435,925 tons. Outward the total was 1,823,240 tons in comparison with 1,408,784 tons, an increase of 414,456 tons. In the net figures there was a jump of 231,504 tons inward and 216,660 outward, the totals being 939,869 tons inward and 947,966 tons outward.

The cargo returns did not work out quite so satisfactorily, for although there was a big increase in exports, the decline in imports was even greater. Inward cargo dropped from 62,616 tons to 49,287, a decrease of 13,329 tons, while outward cargo advanced from 23,532 tons to 32,457, an increase of 8,925 tons.

The passenger figures were highly gratifying. Inward the total rose from 25,636 to 29,045 and outward from 20,915 to 24,496, a total increase of 6,990. In view of the fact that the Western Ocean travel has slumped heavily this year, it must be assumed that the advance in the passenger total is attributable to the popularity of ocean cruising, for which Southampton is possibly the most important terminal.

The increase in the tonnage figures is in part due to the fact that so many foreign vessels which formerly were handled in Cowes Roads or off Fawley are now coming to a berth at the docks.

Smith Cranes used on Southampton Dock Extension.

Smith cranes have played no small part in the making of Southampton Dock extensions, as over twenty cranes were used. The average type were 5 tons and 7 tons size, steam driven, some of which were fitted with grab buckets and special double rope barrels. All are designed for high speed working, and the operation is simple and safe. A factor of stability of 75 per cent. is adhered to.

The cranes will handle loads in any position on the 4-ft. 8½-in. gauge used. The 5 tons cranes have a range of 5 tons at 16-ft. radius, 1½ tons at 35-ft. radius, with gross grabbing load of 3½ tons at 16-ft. radius. The 7 tons cranes have a range of 7 tons at 18-ft. radius, 5 tons at 22-ft. radius, with gross grabbing load of 5 tons at 18-ft. radius. The 7 tons cranes were capable of working at a depth of 60-ft. below the surface.

The grabbing cranes are fitted with special double barrel lifting gear arrangement, the suspending barrel being controlled automatically.

Considering the number of cranes used and the arduous, continous duty demanded of them, repairs and replacements were practically negligible.

The above cranes were supplied to the contractors, Messrs. Mowlem and Nuttall, and Sir Robert McAlpine and Sons.

Manchester Ship Canal Company.

Mr. Alfred Watkin has intimated his intention to retire from the position of Chairman of the Manchester Ship Canal Company, but at the unanimous request of his colleagues has consented to remain in office until October 31st next.

Mr. Watkin will retain his seat on the Board.

Mr. F. J. West has been invited by the directors elected by the shareholders to succeed Mr. Watkin as chairman as from November 1st next and has accepted the invitation.

Mr. West having resigned his position as a director appointed by the Corporation has to-day been elected to the vacant seat on the Board as one of the directors elected by the shareholders.